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LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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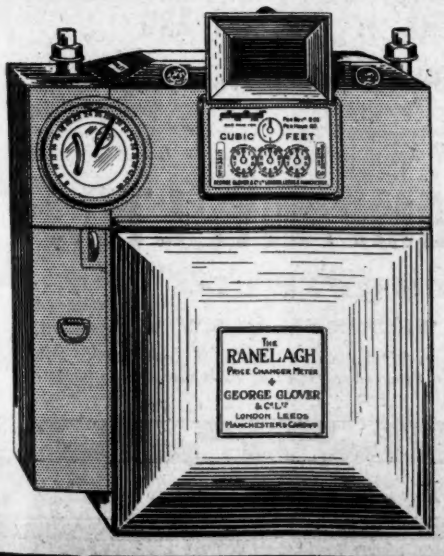

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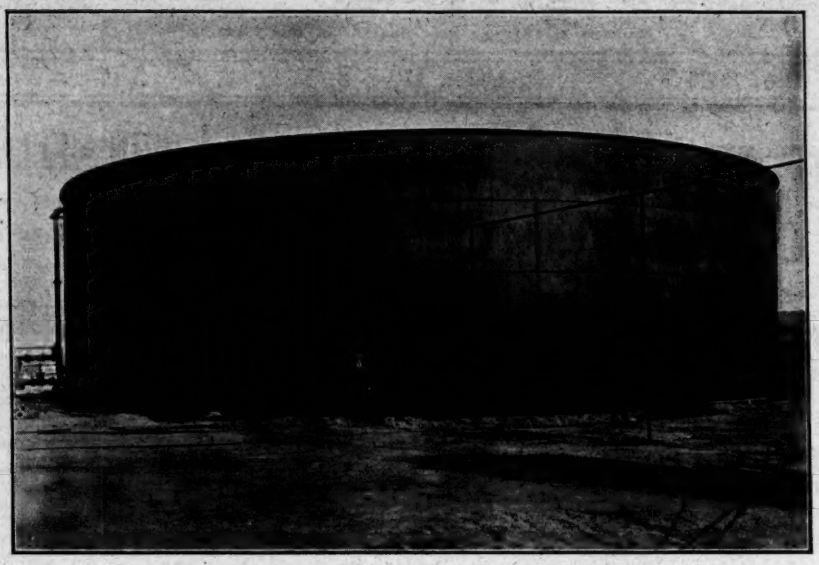

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VOL. CLVIII., No. 3077.] WEDNESDAY, MAY 3, 1922. [74TH YEAR.

EDITORIAL NOTES.

Meter Supplies and the Engineering Dispute.

We regret to learn from the Gas-Meter Makers' National Technical Committee of the Engineering and National Employers' Federations that the majority of the firms in the gas-meter industry are involved, as members of the Federations, in the lock-out which started yesterday as a result of the deadlock reached in the *pourparlers* between the Negotiating Committee of the Federations and the representatives of the Unions affiliated to the Amalgamated Engineering Union, notwithstanding the very reasonable conditions and safeguards offered to the Unions by the employers.

Most of the federated meter makers have for some time been carrying on with difficulty, owing to their having had to dispense with the services of those of their employees who were members of the A.E.U., and who were engaged upon certain important component parts of the meters. The difficulty was further intensified, in the case of four of the firms concerned, owing to premature strikes (varying in duration from one to five weeks) having taken place in their works in connection with the engineering negotiations.

The Federations are making a further effort to prevent entire dislocation of business by giving those men who are willing to accept the employers' terms and safeguards an opportunity of resuming work this morning; but if this offer is not very generally accepted by the men, the federated meter makers will practically be in the position of being able to supply only such meters as they may have left in stock at the moment, and to return only those repaired meters which are at present at the stamping offices.

Every endeavour will, of course, be made to maintain as satisfactory a service as possible under the restricted conditions, but in the circumstances we are quite sure every indulgence will be extended to the meter manufacturers during the continuance of the dispute. Until those makers who are taking part in the defence of a sound principle in management are in a position to get their works fully running again, it would seem desirable for gas undertakings to reduce their present requirements to the smallest possible limits, and not to undertake any important extensions requiring the supply of new meters. It is hoped, of course, that this will be only a temporary matter.

It is pointed out that it was entirely due to the negotiations initiated and pressed to a successful conclusion by the Federations that the meter makers were able to intimate to gas undertakings the last two general reductions in the price of new meters and repairs, which took place on Nov. 17, 1921, and March 1, 1922; and the federated makers feel that the gas industry will recognize this as one of several reasons for supporting the Federations in the stand they are now making for the rights of employers to exercise reasonable control in the works for which they are responsible.

Jubilee and Elevation of Mr. Robert W. Wilson.

The retirement of Mr. Robert W. Wilson from the Secretaryship of the Imperial Continental Gas Association, and his elevation to the Board, are events of no ordinary character. Hence the desire of the Board and the staffs here and at the various stations on the Continent to do honour to him on the jubilee of his service to the Association by entertaining him to dinner, and presenting him with valuable gifts as mementoes of a remarkable relationship, can be well understood by those who, though outside the ranks of the Association, know of its internal workings, of its wonderful successes, and of the antithesis during those long, dreary, painful years of war, and of the notable part that Mr. Wilson, as the executive head of the Association, has taken in its affairs, in the times of peace and in the years that were big with uncertainty. It is the best reward a chief official can have to know that, when he relinquishes the burdens of office, he does so with the goodwill, esteem, and affection of all with whom and for whom he has laboured. Mr. Wilson does that. And it is something of greater value than antique and beautiful examples of craftsmanship in silver—prized memory-awakening gifts though these be. The ability and personal characteristics that have made Mr. Wilson what he is to the Association were eloquently described (at the dinner reported elsewhere in this issue) by Sir Charles Jessel and Mr. A. F. P. Hayman as the senior active officer abroad. We could add to their speeches our tribute in much the same language and with the same intensity of feeling, inasmuch as Mr. Wilson's friendship has for many years been enjoyed not only through business relations, but through journeyings on the Continent. He passes from official capacity to the Board accompanied by a host of good wishes more deeply felt than can be expressed in words. His translation to the Board was something that could not well have been avoided. It was a natural sequel to such service as his; for there is no escaping the fact that Robert Wilson and the Imperial Continental Gas Association are so welded together that separation could only possibly come by the physical infirmity of the one, or the close of life of the one or the other. For his loyal work for the Association in peace and war, all connected with the Association are grateful, as are all for his big-hearted friendship.

Gas Making and Other Matters in a Provincial Town.

It was some fourteen years ago that the Eastern Counties Gas Managers' Association visited Leighton Buzzard. The memory of the occasion still lingers with many. The memory of the pleasant visit paid to the town again last Wednesday will also be treasured by those who were fortunate enough to take part in it. Fourteen years ago, the then Engineer and Manager of the Gas Company (Mr. C. F. Ruggles) was the President of the Association. The son (Mr. H. G. Ruggles) succeeded the honoured father in official position; he now occupies the chair of the Association. The Presidential Address with which he inaugurated his year of office was of a highly practical character; and it carries with it a valuable message. It shows how a gas undertaking of moderate dimensions can in its processes march with the times, when its fortunes are in the hands of a capable technical adviser, who is in the good position of having a Board who will ratify those things which appeal to them as necessary to enable advance. Glibly people say the times change, and with them requirements. This is true; but, however good and competent they may be, there are some gas engineers who have Boards and Committees who say: "We must get along as best we can with what we have got," and who will not listen to those considerations that urge the spending of money with the view to economy and the meeting of current demands, so making a lucrative investment. Reading the Presidential Address, we leave it with the view that here is an example of an undertaking, making no more than just over 80 million cubic feet of gas a year, and yet the possessors of plant that, through its combined flexibility, enables them to meet any demand or sudden flight in demand, and, whatever befalls, to protect the consumer by supplying him with gas of a uniform calorific power and pressure.

The gas plant at Leighton Buzzard is demonstrating to-day, and will soon do so better still, that works of only moderate output can be equipped with modern types of plant and conveniences, and match the best of works in the matter of performance. The day has passed when the engineers of such works need sit and envy the opportunities and conveniences in plant possessed by the larger works. Invention has worked downwards in the productive magnitude of types and units, and has done this while maintaining, in capable hands and under intelligent supervision, a high working and thermal efficiency. It is perfectly obvious that the Board of the Company and their Engineer are determined that whatever economies can be made available for the benefit of the consumers and the stability of the undertaking, shall be secured; and thus they are carrying on the progressive policy which has done so much to increase and improve the business during the years that have passed since the Association were last in the town. There is something notable about what has been done in this respect. The population has remained stationary during those years—the increase being only 33. But the town shows how, with a practically fixed population, business enterprise has netted an increase of 61 p.ct. in business in that period. And this increase has been obtained with an extra consumption of coal or other materials equal only to 39 p.ct. This is excellent testimony to technical and commercial ability. We may rely upon it that nothing but absolute stagnation in the development of the district will prevent their continuing this good business-developing work. The address furnishes complete evidence that the Board and their Engineer are looking forward. There is the Gas Regulation Act, and all the opportunity that it offers. The Company are operating under it. Of the liberty that it gives, they are going to take advantage as and when it is politic so to do. At the same time the Act is exacting, and properly so. But the Company in their plant are assured of the fullest possible protection for themselves and satisfaction for their consumers.

What has been done in the matter of plant, which puts the concern in a strong position for meeting its obligations (though it should be said choice is not confined to the types that have been selected for Leighton Buzzard), will illustrate to other managements of works making under 100 million cubic feet of gas per annum, how they, too, can place themselves in a position to meet new conditions with safety, and an elasticity which is valuable in these times when cookers and gas-fires (in some cases industrial applications) cause such wide diversity in demand. The Company two years ago installed a Dellwik carburetted water-gas plant, which has endowed them with the ability to maintain their gas at a fairly constant calorific value, and yet meet any sudden demand for an increased supply of gas. One word about this plant. It has been erected against the retort-house, so that coke is delivered to it without any additional labour. This is constructive wisdom, and so good engineering. But we should like to see the system that has been adopted for one plant at Brentford copied to a larger extent. In this, incandescent coke is transferred direct from retorts to water-gas generator; and thus heat which would otherwise be wasted is saved. However, at Leighton Buzzard, with one man looking after the entire operations, 120 therms of blue water gas are produced per ton of coke. The water gas enters the foul main at a temperature of about 35° C.; and by this means it is possible to admit up to 30 p.ct. of blue water gas without making any appreciable difference to the calorific value of the mixed gas. Carburetting can be practised just as necessity requires. We get there the ability to meet varying demand, and the protection that technical development has afforded for moderate sized as well as for large works.

What has been done does not stop there. That vertical retorts are only for big concerns is a fallacy which should no longer exist; but nevertheless it does persist in the minds of not a few managers of moderate sized works. Leighton Buzzard will soon add its demonstration to the contrary. There is now being erected there a small vertical unit known as the "Adaptable." It has been introduced by Messrs. E. J. & J. Pearson, of Stourbridge. It is a plant that can be used for the manufacture of coal gas (either straight coal gas or mixed gas) and, with slight alteration, it can be converted into a complete gasification plant. In considering capital outlay, one has to have regard to production; and Mr. Ruggles states that this plant compares very favourably with horizontal plant of a similar capacity, and that the cost of repairs and renewals, it is estimated, will be at least 30 p.ct. cheaper than for horizontals. An important contribution to the range of adaptability is that the heating arrangements are such that the temperature can be adjusted, as desired, at any point in the length of the retort. The President describes in his address the structural features of this small unit of vertical retort plant. As to capability, he says that 18,000 c.ft. of 450 B.Th.U. gas can be produced per ton with steaming, which is equal to 81 therms. If the necessary modest modifications are made for complete gasification, the make is 50,000 c.ft. of 400 B.Th.U. gas, which is equal to 200 therms. This is a figure we shall be interested in seeing demonstrated, in view of the fact that it means that in the gas produced there is at least 66 p.ct. of the total thermal value of a high-class coal.

With plant capable of such variable quantitative and qualitative production, the Company will have no difficulty in maintaining the calorific value which they have initially declared—480 B.Th.U.—or for the matter of that any other reasonable and economic calorific value. They are working with a margin of 4 B.Th.U. They are able to operate as closely as this with 80 p.ct. of coal gas having a calorific value of 530 B.Th.U., and 20 p.ct. of blue water gas of a calorific value of about 300 B.Th.U. When making this first declaration, the Board, guided by their Engineer, rightly took into account current conditions. Having regard to the plant they possess and have in hand (not overlooking the pressure-raising plant), we shall not be surprised if, after a period, there is a revision, in order to assist in reducing the price per therm. There is good argument in the paper for maintaining, at the outset, the calorific value at the figure that obtained before the Company secured their Order under section 1 of the Gas Regulation Act. It is that they wanted to avoid the double complication of making (at one time) a change in the basis of charge and a change in the calorific quality of the gas per cubic foot. What the members of the gas profession know as to the approximate parity of efficiency in use, with the necessary adjustment of appliances, of a long range of calorific values per cubic foot is not the knowledge of the consumers; and the less suspicion (though unfounded) that is engendered, the better. In view of this, a good time to make changes in declared values, if of the downward order per cubic foot, is when production conditions (including materials and labour) show that a reduction in price per therm can be made.

In connection with this matter of calorific value, and the complete protection that is given to the consumers in regard to it by the provisions of the Act, the President pointed out that, while this is the case, most gas suppliers have not the same protection in respect of the supply of coal. If the supply of a good and uniform quality of coal is not assured, he asked, how can gas suppliers be expected to maintain consistently the standard quality of gas? There is fair reason in the argument; but the President proves by his address that he has protected himself against fluctuations by the capacity of his water-gas plant for making any quality of gas he desires. In view of this provision, we are afraid that frequent tests of the calorific value of the coal (even if found below the quality contracted for) would not supply a sufficient answer to any deficiency in the declared calorific value of the gas, nor would it be accepted as justification for the submission that the circumstance of calorific deficiency in the gas were beyond the control of its manufacturers. It might be in certain events in the case of an all-coal-gas undertaking, or one supplying a proportion of blue water gas, and without any means of enrichment. We quite agree that coal should be purchased for gas making on a qualitative basis, and not in the haphazard way that is so frequently the case at the present time. There is accord, too, in the suggestion that, if an improvement is to be effected in this matter, the initiative will have to come from the purchasers. The colliery owners are not likely to make the first move. But what move can be instituted by the gas industry? This is a point for discussion. Whatever was done would have to be of a co-operative nature; for the plan that the South Metropolitan Company have tentatively adopted, of systematically conducting tests in the area whence their coal supplies are drawn, could be emulated by but few undertakings. One step that Mr. Ruggles suggests is that there should be insistence on a clause being inserted in coal contracts whereby an allowance shall be granted by a colliery for excesses of ash and moisture beyond the contracted-for percentages, as well as for deficiencies in the calorific quality of the coal. The President also submits the need for up-to-date tables of

reference, containing statistics setting out, among other important information, the thermal value, composition, ash content, and suitability or otherwise of coals for carbonizing in either verticals or horizontals. Such tables, he says, would be of inestimable value. We will not deny this. But we would draw the President's attention to one of his own previous remarks: "We know from experience what wide "variations exist in the quality and characteristics of coals "from the same seam; and, although the price is ruled to "a great extent by the district from which the coal comes, "yet it is often experienced that supplies from a first-class "colliery are received which, from a gas-making point of "view, are inferior to consignments delivered from a "second-class district." The truth of this quoted statement is well accepted; but in it we see a qualification to the plea for the tables of reference, and to their value.

The address deals with other subjects which have invited a large amount of consideration in recent times—such as consumers' meters, policy and practice in connection with prepayment consumers, the current position of secondary products, naphthalene, and the value of distribution department records for small works. The only superfluous part of the address are the words: "I thank you for the patience "with which you have listened to me." The cordial thanks of the members to the President for his address are more in accord with our own feelings after perusing it.

The Moore Two-Stage Generator Plant.

THE experimental and development work at Scunthorpe on the Moore gas generator, together with the indications of results that have been published from time to time, have aroused in gas technical circles an amount of interest in the system. It does not, however, stand alone. It is one of a class; and its cognates make equal claim to merit. It will rest with the rivals to settle the question of superiority or equality by working performances under various conditions. Apart from this, it is quite obvious that many gas engineers have not yet succeeded in thinking in terms of gas productions either in cubic feet or (more properly) therms such as are derived from the more or less complete gasification of coal. This is quite pardonable, after living a professional life that spans gas makes of no more than from 10,000 to (let us say) 14,000 c.ft. per ton of coal carbonized. There are, too, those engineers who are well placed for the disposal of secondary products who question whether their balance-sheets would come out any better by selling 80 p.ct. or so more therms than by continuing to conduct business on present lines. As to this point, everything depends upon the permanence of the good markets for secondary products. In a residential district it goes without saying that the market for gas will always be more constant than the markets for secondary products; and the disposal of secondary products is also more susceptible to industrial fluctuations than is gas.

The paper Mr. S. Moore read before the Eastern Counties Association last week shows that he has great expectations from his improved plant in the way of results; but thermally those he presents are not so extravagant as some seem to fancy. The expectations are based upon the work at Scunthorpe with plant that has not attained the maximum development. Plant such as, upon that experimental work, Mr. Moore has now designed has not yet been in operation, though examples will soon be in existence. When this is accomplished, it will be interesting to learn how far the expectations, which have a place in advance of the working with the less perfect plant at Scunthorpe, will be achieved. There was some criticism at the meeting of those results on the ground that they are on the high side. But are they? Take 30,000 c.ft. of 419 B.Th.U. gas, this is equal to 125·7 therms; assume that 6 cwt. of coke has a calorific value of 12,000 B.Th.U. per lb., there we have 80·6 therms; and the calorific value of the 8 gallons of tar would leave an ample balance of thermal value from coal (having a value per ton of 280 to 300 therms) for fuel expenditure and heat losses, both of which are kept low by internal heating. These figures have either been obtained or they have not;—and both Mr. Moore and the present Manager at Scunthorpe attest their validity.

The fact that there is coke for disposal shows that the plant has not been normally worked for complete gasification. As a matter of fact, it can be operated as desired—to produce gas of any necessary calorific quality, and coke containing (as things go) a fairly high percentage of volatile matter down to quite ordinary coke; or, alternatively, complete gasification can be practised. Regulation in respect of the volatile matter content of the coke is governed by the rate of coal throughput in relation to the temperatures employed and the physical characteristics of the coal. In respect of the calorific quality of the gas, the process being a two-stage one, the proportions of coal to water gas can be regulated to produce any quality of gas from 450 B.Th.U. down to 190 B.Th.U. gross. It will be seen from this that the system can be made (as is also claimed by other systems) to operate to suit any desired circumstances; so that the engineer who wants all gas, or has a sudden demand for more, can have it, or the engineer who desires secondary products can work to their realization. The adoption of such plant therefore does not tie one down to any hard-and-fast line of operating procedure.

So long as claims are not extravagant, we, at all events, are not disposed to criticize, but are content to wait for the erection of the improved type of plant and its actual working to demonstrate how far the present confidence of Mr. Moore is justified. The confidence is accentuated by the desire that an independent Investigation Committee shall then explore the working results.

Artistic and Efficient Gas Lighting.

CAN gas lighting claim to have both attributes of being artistic and efficient? It can; but not always as applied. Yet there is no reason why it should not "always." If it can be made artistic and efficient in one place, it can be in all. Whose fault (to a large extent) is it that it is not? Whose fault is it largely that more lighting business has been lost to the gas industry, and has gone over to electricity, than should have been the case? The answer is the gas undertakings. In this matter many of them missed their opportunities; but why, they themselves must know best. But out of this condition some good has issued. It has awakened many from that state of somnolence and indolence into which a false security had at one time allowed them to slip. But there is room for further improvement in this respect. We find expression given to this in the address that Mr. J. W. Lofts, of Messrs. William Sugg & Co., Ltd., delivered last Friday to the London and Southern Junior Gas Association. His work carries him all over the kingdom; and he has many opportunities for casting a practical eye over what gas undertakings are doing in the matter of lighting. He makes no secret of the fact that he finds many things are not done which ought to be done. He sees showrooms that most illustrate everything that ought not to be —that present no signs of progress, that are not attractive, that illustrate appliances that are to-day hideous, inefficient, and poor in quality and inartistic. He does not say all this; but it is very easy to interpret and to expand the few words that he does say on the subject. He does not—he could not—allege that this is the case generally; but that there are many undertakings whose standards are of the mean kind seen in their showrooms is something which is to be deplored, for it is very much out of harmony with modern ideas as to the fitness of things. Where these characteristics exist in a place that is wrongly designated a "showroom," in the same undertaking will frequently be found indifferent business practices and methods. It follows that, where there are these indifferent practices and methods, electricity, in every application of lighting, has an easier course to travel in supplanting gas—particularly in the home. Where the policy of the gas undertaking is to devote attention to the question of home, shop, office, factory, church, and school lighting, there the rival system has greater difficulty in making headway.

Of course, one cannot in this matter of lighting do much where preference has already made selection; but where it has not, then the best that gas can do in any position will supply the strongest resistance to change. As Mr. Lofts shows, gas has made large strides in economy, efficiency, and artistic merit. Just as incandescent mantles of the old style swept flat flames so largely out of existence, and enabled progress to be made in gas manufacture, so the inverted mantle is sending the upright one fast into the throng of the superseded; and now the medium or bijou inverted mantle used in cluster form is evicting the large "Universal" size inverted mantle, which to-day is not in any sense "universal." In shop and street lighting particularly, the superheated cluster form of small size inverted mantles is becoming largely the vogue on the score of merit alone.

Mr. Lofts points out that with these clusters one can get 30 to 40 p.ct. better illumination with smaller gas consumption; the maintenance costs are lower; and there is only one gas and air regulator to manipulate instead of three or four. Many gas undertakings have converted, or are busy converting, shop and street lamps to this higher efficiency system; and Mr. Lofts hopes that before long there will be no inverted mantles in use larger than the medium size. With the grade of gas now being manufactured, apart from the question of economy and efficiency, it is more than likely that his aspiration will be quickly realized. One singular aspect of this business is that so few gas undertakings in the competition make use of the merits that gas lighting possesses—qualitative and economical. They ignore the former, and degrade the latter by neglect. There is the question of glare; gas is superior to electricity in this respect. There is quality of light; there again gas scores. There are the features of steadiness and reliability; gas in these respects is incomparable. Then there is economy. Mr. Lofts show how, in cases, the whole cost of converting gas-lamps to high efficiency methods will be paid for in a few months, by the economy achieved—that is to say, more light will be obtained, and money will, after the conversion is paid for, be saved. Are gas men making sufficient point of this when local authorities are talking of spending thousands of pounds in converting street gas-lamps to electricity? Do the managements of all gas undertakings before that time arrives ask to be allowed to demonstrate what these superheated clusters of small mantles are able to achieve? There is a statement in the address, in connection with this question of street-lamp conversion, of which a wide use should be made by gas undertakings. It is that in one provincial city, 8439 lamps were converted from upright to bijou inverted cluster type lamps, at a cost of £2304; and they realized not only better illumination, but also, in the first year, a saving of £5305 in gas and mantles. The installation therefore paid for itself in five months, and then earned a dividend of 125 p.ct. Yet there are some public authorities who still use upright mantles. Mr. Lofts asks, and with good and strong reason, Why? Why, indeed, when conversion is a matter of so much profit.

The address deals briefly with the use of gas for lighting in several important spheres; but there are two points which we would particularly emphasize in connection with factory and school lighting. They are that the low instrinsic brilliancy of gas lights should be favoured having regard to the eyesight of workers and scholars, and that advantage should be taken of the heat of the lamps to procure improved ventilation. The address is a highly practical one; and we hope that it will have an excellent effect in stimulating interest in the subject.

Excess Calorific Power.

The official reports on the calorific value of the gas supplied last quarter by the South Metropolitan and the Commercial Gas Companies (referred to in our news columns) are interesting in respect of the heat units that were, on an average, supplied beyond the declared value by the two Companies. The declared value of the South Metropolitan Company is 550 B.Th.U. They supplied an average of 556·4. It will be remembered that the Company have now declared a value of 560 B.Th.U., which will shortly come into operation. The Commercial Gas Company's declared value is 475 B.Th.U.; but they supplied an average of 505·2 B.Th.U.—an excess of 30·2 B.Th.U. If there is no error here, then the consumers in the East-end of London had a therm thrown in with every 3333 c.ft. consumed, or in money 1s. 1d.

The Lock-Out Developments.

The members of the Amalgamated Engineering Union have been locked-out for some weeks now. They are self-constituted martyrs. They are suffering for a principle, but a principle the conception of which bears distinct traces of dementia. They do not want the employers to be masters in their own houses, nor to exercise their managerial functions in a way which does not meet with the fullest approbation of the Trade Unions. There are 47 other unions whose representatives do not mind the employers exercising managerial functions, so long as they do not make any "material change;" but they decline to allow the employers to have the right to determine what is a "material change." The employers are expected to consult the Trade Unions on the matter; so that, if the employers and the Trade Unions do not agree whether a proposal is or is not a material change—well then there may be trouble. If the employers conceded the right of interference to this length, there would never be freedom from disturbances. Through the breakdown of negotiations, and in the absence of agreement, the suspension of notices of a lock-out of the members of the 47 Unions has been cancelled; and the large extension of the lock-out began yesterday. Following the breakdown of negotiations, the Government appointed a Court of Inquiry, who will consider the differences between the parties. The employers on their part have given notice that the shops will be open to-day, "in order to ascertain the willingness of the workpeople to work on the conditions which have proved reasonable." This is the position; and it is a serious one. Many industries will be affected; among them a large part of the gas-meter makers. They have not perhaps much direct interest in the dispute as to shop management; but, being members of the Federation, they are in honour bound to take their part in the protection of the rights and liberties of the employers. A reference to their position appears in our "Editorial Notes;" and we ask those responsible for the management of gas undertakings to mark particularly what is said there. To say the least, it would be extremely unfortunate if those meter makers who are standing up in defence of the legitimate rights of employers should in the result suffer any avoidable penalty. Looking at the matter with perfect disinterestedness, we must say that right up to Easter time, the employers were anxious that the engineering industry should not be thrown into chaos over this particular difference; and they proposed a scheme of procedure for the avoidance of disputes, every line of which appeals to us as fair. Unfortunately, it is the obstinacy of the Unions in pursuing a course of unfairness in assailing the employers' rights that has brought about the present stoppage.

Gas Coal Position.

Reports from the coal-fields are generally unanimous as to the position not being so strong, owing to the decline in demand. There is little change in the situation in the areas from which gas coal is exported. Some of the collieries in the northern fields are still fully occupied with their home and export contracts for immediate delivery. This is not, however, general; and from other sources supplies were last week available at round about 22s. per ton f.o.b.

Industrial Gas.

The Engineer-in-Charge of the Industrial Research Laboratories of the Birmingham Corporation Gas Department (Dr. C. M. Walter) never makes written contribution to the subject of the application of gas to industrial purposes without we are able to find something new in what he has to say. The reason is that the use of gas in industry is only still in the nascent stage; and the keen explorer into it is always discovering new problems for solution, and fresh extensions waiting to be made. It is, as a matter of fact, one of the most fascinating branches of the gas business to-day; and there are large business possibilities in it, subject to the costs of gas production being reduced, and the efficiency of gas-consuming apparatus being further improved. In this matter of the development of the use of gas for industrial purposes, the Birmingham Gas Department stand out boldly for progressiveness and circumspect policy; and, despite the higher price of gas through circumstances beyond control, they show a praiseworthy record of business expansion. This it is clear from the paper Dr. Walter read at the Coventry Conference of the "B.C.G.A." last week, will be greatly enlarged as time passes. The sale of gas for industrial purposes in Birmingham amounted to 609,424,800 c.ft. in the year ended March, 1913; while at the end of March last, the industrial consumption was 1,347,637,300 c.ft.—an increase of no less than 738,212,500 c.ft., or 121·1 p.ct. This is good advance. We should have liked the respective figures translated into therms. In volume, the increase might have been larger still had it not been for the price. In fact, there are some manufacturers who have reluctantly had to give up all the acknowledged and actual benefits conferred by gas operation, and retrace their steps to coke heating, while some have adopted oil heating. It is purely a question of economy. But given an acceptable price for gas, its merits will bring those manufacturers upon the books again as consumers. Notwithstanding these temporary

abandonments, the figures in the paper as to individual consumptions show that there are manufacturers on the large scale who find that, even at current prices, the use of gas is a paying proposition. Several matters are touched upon by Dr. Walter affecting conditions essential to a larger progress in the applications of gas to industrial heating. He also puts in a word for the manufacturers of gas-furnaces. We agree with him that they have done remarkably well in producing furnaces for a variety of needs; and, in doing this, they have gone to a considerable expense in experimental work and the production of designs. In view of this, he thinks that it is only fair that gas undertakings should collaborate with the manufacturers when special types of furnaces are required, which need new designs, and fresh experimental work in developing them.

Rating of Machinery Bill.

This Bill has had second reading in the House of Commons. Its benevolent and very laudable object is to make it clear that in estimating the rateable value, for the purpose of local rating, of any hereditament which may be used for business or manufacturing purposes, machinery shall not be included unless it is fixed or attached to the hereditament. It is agreed that industry is much over-taxed, and that all the charges upon it are too great to enable the fullest and fairest competition with foreign producers. This taxing of machinery not fixed to a hereditament means an additional overhead charge. It likewise supplies an obstacle to manufacturers scrapping old plant and adopting new, seeing that this otherwise prudent course will only mean higher rating and a larger payment. Some members—an insignificant minority—in the House of Commons appeared to think that this was not a favourable time to abrogate the rating of unfixed machinery. But Sir Alfred Mond (Minister of Health) knows a great deal about industry, machinery, and the oppressive and retarding burdens of manufacturers. He confesses that he finds our rating system extraordinarily little adapted to modern industrial conditions; and the more he considers the whole question of rates, the more he is driven to the conclusion that the rating of the means of production is economically unsound. So the Bill had second reading.

A Research Gift.

In scientific and technical spheres, there will be a large amount of gratitude to the Hon. Sir Charles Parsons, K.C.B., for the gift he has made to the Trustees of the British Association of £10,000 Five Per Cent. War Loan Stock, which he has placed unreservedly at the disposal of the organization. It is a notable benefaction; and it is certainly the largest the Association has received since before the war. The Association are directly interested in research in several directions; among them in fuel economy. Sir Charles is a member of the Fuel Research Board, as the inventor of the Parsons steam-turbine ought to be. It would therefore be fitting, in view of his close interest in fuel problems, if at any rate part of the income from the £10,000 was devoted to fuel economy research; but there are some people who think that the British Association Fuel Economy Committee is a superfluity with the Fuel Research Board and other influential investigating bodies in existence. Anyway, if the Association devotes money to fuel economy research, it should be on the clear understanding that the Fuel Economy Committee does not again go out of its way to attack a large fuel-using and supplying industry with the view to inflicting upon it certain academically born restrictions, which subsequently two independent Departmental Committees concluded were altogether unnecessary.

Work of Bacteria in Coal.

Recently, before the Manchester Geological and Mining Society, Mr. James Lomax interested the members with the results of a microscopical examination of batt and other kindred substances in coal-seams. Bacteria seem to have played a large part in the conditions which are found in coal. In batt and other substances, the remains of bacteria and micro-fungi are to be found. This is interesting, because it is known that certain forms of bacteria have the power to extract iron from the decaying and pulpifying vegetable humus; this being classed as iron bacteria. There are also sulphur-producing bacteria—such bacteria, with the aid of microscopic algæ, having the power of transforming sulphate of lime into sulphur. The fixation of nitrates in soil is the work of bacteria and other micro-organisms, and a host of other bacteria which have played their part in carboniferous times just as they are doing to-day. From this it may fairly be assumed that most of the inorganic mineral products found in coal have been extracted from the tissues of the once living plants, and deposited in various forms in the coal substance, mainly by the action of bacteria and other micro-organisms. Such products include carbonates of iron, iron sulphide in its various forms, calcite, certain forms of magnesia, sulphur, and aluminous substances, and possibly many others of which little is yet known. By research, the conclusion has been arrived at that, through the work of such micro-organisms, the products of their activities were left in such a condition that, when exposed to atmospheric influences and suitable positions, heating and spontaneous combustion will take place.

PERSONAL.

At a meeting of the Court of the University of Leeds, held last Wednesday, it was decided to confer various degrees, *honoris causa*. Among them was that of Doctor of Science upon Sir DUGALD CLERK, F.R.S.

The Hon. Sir CHARLES PARSONS, K.C.B., F.R.S., a member of the Fuel Research Board, has presented to the Trustees of the British Association for the Advancement of Science a gift of £10,000 of 5 p.ct. War Loan stock, which he has placed unreservedly at the disposal of the Council.

We are very sorry to learn that the Right Hon. Sir DANIEL F. GODDARD (the Chairman of the Tottenham District Light, Heat, and Power Company, of the Ipswich Gas Light Company, and of the South African Lighting Association, Ltd., and a Director of the Gas Light and Coke Company, &c.) has been laid-up for some weeks on account of heart trouble. There will be a unanimous wish for his speedy restoration to good health.

Mrs. THOMAS GLOVER, of Fitzjohns Avenue, N.W., wishes again to acknowledge in these columns the many and continued inquiries she has received as to Mr. Glover's progress after his operation. He is going on as well as can be expected.

Mr. JOHN HUNTER, J.P., a Director of the Derby Gas Company, has been unanimously elected Chairman of the Belper Urban District Council, in succession to Alderman G. H. Strutt, J.P., who had held the position since the formation of the Council.

His many friends in the industry will be gratified to learn that Mr. HERBERT LEES, Engineer, Manager, and Secretary of the Hexham Gas Company, has been placed on the Commission of the Peace for the County of Northumberland.

OBITUARY.

It is with the deepest regret that we have to announce the death, at the age of 66, of Mr. W. S. CURPHEY, late Chief Inspector under the Alkali, &c., Works Regulation Act. He died on April 25, after an operation; and cremation took place at Golder's Green Cemetery at noon last Saturday. It was in the "JOURNAL" for Sept. 22, 1920, that we announced his retirement from the position of Chief Inspector, in connection with which office he did a very large amount of valuable, instructive work of chemical and technical interest to the gas industry. Prior to succeeding in 1910 the late Mr. R. Forbes Carpenter as Chief Inspector, Mr. Curphey was in entire charge of the work of the Department in Scotland.

The death took place on Tuesday, the 25th ult., of Mr. JOHN THOMAS CROXFORD, the Secretary of the Brentford Gas Company. Mr. Croxford, who was in his 63rd year, was at the office on the previous Tuesday, apparently in his usual health. On the evening of that day, however, he was taken suddenly ill with what proved to be bronchial pneumonia; and though hopes were entertained of his recovery, he failed to rally, and passed away in less than a week from the commencement of his illness. A native of Brentford, Mr. Croxford had been in the service of the Company for over 45 years, for the last nine of which he filled the position of Secretary. The funeral was on Thursday last, and the large attendance, which included the Chairman (Mr. R. J. N. Neville) and the Engineer and Manager, testified to the respect and esteem with which Mr. Croxford was regarded by all connected with the Company.

The death has occurred, in his 84th year, of Mr. WILLIAM BLOW COLLIS, of Swinford House, Stourbridge. For a long period he took a prominent part in the public and industrial affairs of the district, and was for 25 years a Director of the Stourbridge Gas Company.

National Coal Resources.—From H.M. Stationery Office, we have received No. 1 report on the Physical and Chemical Survey of the National Coal Resources. This deals with the "Correlation of Data for the Yorkshire, Nottinghamshire, and Derbyshire Coal-Field." The price (post free) is 2s. 1½d.

ELECTRICITY SUPPLY MEMORANDA.

Now that the Electricity Supply Bill is through the House of Lords, its friends are wondering what will happen to it in the House of Commons. There is a good deal of timidity among them. It is anticipated that there will be a good shoal of amendments, and that there will be a large amount of opposition on the part of men who probably know something more about these matters than the noble Lords, though it was the House of Lords that made considerable facial changes in the original Bill, and have modified the present one. It is hoped by the "Electrical Review" that any amendments now put forward will be only those which will benefit directly either the electricity supply undertakings themselves, or the joint authorities, and not be merely covert attacks on the principle of the Bill. Of course, opposition takes two directions. There is actually no attack on the electricity undertakings of the country. But there are those among the opponents who are still of opinion that the reorganizing schemes are of a character that will not be to the best advantage of the industry, but will tend, through the proposed revolution, to imperil the rapidity of its economic advance. There are those, too, who strongly object to local authorities who are borrowers of money becoming lenders of borrowed money to these joint authorities, over whose operations they will have no conclusive power. It is true that a certain amount of protection has, through the amendments in the House of Lords, been given to ratepayers; but the whole idea of the proposed financing is repugnant to those who are authorities on these matters. This is a point that the electrical papers with one accord do not discuss. The "Review" seems to think that all should now be well with the Bill; that those who had objections ought to be satisfied. It points out, for example, that the power companies have obtained very important concessions and a modification (in their favour) of the existing Act, with the result that they are delivered from the menace which they have always feared in the shape of possible competition by the joint electricity supply authorities. Then it is said that the electricity supply companies have a valuable asset in the clause which empowers the Electricity Commissioners by an Order to grant an extension of tenure under certain conditions, which is obviously a matter of most important consideration—to the companies, if they are able to satisfy the Commissioners. Further, local authorities are now placed in the same position as the companies with regard to the ability to obtain revision of the price charged to the consumers. It is also pointed out that the joint authorities will have financial powers, and so will be able to function. For the benefit of those who felt qualms as to financing, there are certain safeguards—"certain," but are they sufficient? So our contemporary manifestly thinks that all should be satisfied; but they are not. What is proposed cannot be carried out without a heavy expenditure of money; and the country is in such a state financially that the magnates of the financial world have been issuing grave warnings, which have reached the ears of the Chancellor of the Exchequer and the Government, and are disturbing them not a little.

The Bill and the Next Stage.

The Advisory Board Alternative.

There are one or two important areas of the country that are to be free from the operations and attentions of a joint electricity authority. The South-East Lancashire and the Birmingham areas are to have advisory bodies, and not joint authorities. They are probably lucky. The South-East Lancashire case is a notable one. What Lancashire thinks to-day, England will think to-morrow. The time may therefore come when the parts of the country with joint electricity authorities will devoutly wish they were under advisory boards, and not saddled with a piece of machinery the parts of which do not cog well, and so cannot work smoothly, and with economy and efficiency. A striking thing about this South-East Lancashire district scheme is that the local authorities in the area were almost unanimous against a joint authority, and favourable to an advisory board. Only Salford and Stretford appeared in favour of a joint authority. With such a mass of opinion, the Electricity Commissioners could not do otherwise than submit to the wishes of the local authorities, though it is quite manifest that it cut against the grain to do so. It would have created a queer position if the Electricity Commissioners had decided that their opinion should override the almost unanimous local governing judgment. In truth this is one of the strongest blows the joint authority system has experienced; and it is an example which other areas may now question whether it would not have been advisable for them also to have adopted. The Commissioners express some doubt as to whether the provisions by which the Advisory Board will make representations to the constituent authorities, with a right of appeal to the Commissioners, will enable sufficiently comprehensive works to be undertaken. We see no reason why they should not. The Commissioners are pessimistic. Apparently they think the numerous local authorities concerned and their technical advisers in the bulk constitute something more inefficient than a body composed of all sorts of elements drawn with little regard to qualification from each authority, all possessing views differing in some respects, and ever watchful that other elements do not exceed them in the material benefit their constituents will secure from any work that may be done. The Commissioners fear that under the Advisory Board there will be a tendency to proceed by piecemeal extension of stations and interconnecting of lines, at an ultimate increased cost to the constituent authorities and the consumers concerned. The narrow views of the Commissioners seem to disclose a disappointment at this breakdown in an important area of the express intentions of the Act; and the disappointment produces a weakness in their argument which is not generous to the technical men who will be on the Advisory Board and to the Lancashire authorities whose record is certainly not one of deliberate obstruction to progress. Anyway piecemeal development may, with all due respect to Sir John Snell and his colleagues, be the prudent way, and perhaps the only way. Time will show whether the consumers of electricity will fare worse under the Advisory Board plan than under the Joint Authority one.

Unoccupied Areas.

Another point the Commissioners make in reluctantly giving consent to the Advisory Board is that this body may also experience difficulty in securing supplies for unoccupied areas. Why should they, if there is profit in the business? But the Commissioners are proposing to exercise some control over this matter. The Advisory Board will be required within two years to submit a proposal for securing supplies within areas which are not at the date in the areas of supplies of authorized distributors, and in which there is a reasonable prospect of such supply being remunerative. Who is to determine whether or not there is a "reasonable prospect"—the technical advisers of the local authorities or the Electricity Commissioners? There are other ways of affording unoccupied areas a supply of electricity without expensive transmission systems; but the Electricity Commissioners think that "comprehensive" schemes of extension are the only method whereby the areas devoid of an electricity supply may obtain a service. What they are proposing may mean an exorbitant cost to the consumers, having regard to the proportion that capital costs bear to the total costs of providing a supply. The Advisory Board will, we imagine, have upon it technical competence in larger measure than a joint authority; and therefore we are inclined to think that, under its advice, progress will be made (as tested by the advantage to the consumer) more rapidly than will be the case with joint authorities.

Intensifying Domestic Electrification.

"Meteor" of the "Electrical Times" heads a paragraph "The Great Electrical Offensive of 1922?" It will be noticed that he wisely puts a note of interrogation at the end of the heading, which implies some doubt as to whether there will be such an "electrical offensive." However, he thinks the time has come when every station engineer (if he has not already done so) should consider seriously plans for an intensive electrical campaign. It is admitted that in individual cases difficulties still exist. They are summed-up as inadequate generating plant and (or) distribution mains, shortage of capital, uncertainty as to the future under joint authorities, cost of services, and tariffs involving dual meters. Our friend asks, Are these difficulties unsurmountable or more than temporary in but few cases? Anyway, he does not consider they should be allowed to render the offensive spirit impotent. He also looks upon the domestic load as a potential gold mine. The difficulties of which he speaks are not the only ones. The prices of electric appliances and of heat units supplied the electric way are high, and beyond the means of most householders. To entertain hope that electric appliances and electric heat units will be adopted by all the constituent parts of our social system is to take a flight in fancy beyond the facts of human existence and doings. Prices of electric appliances and of electric heat units are descending; but so are the prices of the competing agents. And the major part of the householders of the country will always regard these things relatively, and choose that which brings to them the greatest economy. We are aware that prices for current for heating and cooking, where they were 2d., have in cases been brought down to 1½d., or thereabouts. Even so, it is only the more affluent who can afford to pay 1½d. for 3420 heat units, however high the efficiency in use; and for kitchen work the efficiency is not at the best a very high quantity, and with progressive depreciation of the elements it is a declining one. Gas is also coming down in price, so that the competition goes on much on the old terms; and electricity on the old terms always experienced difficulty in making headway for purposes other than lighting. The Electrical Development Association and the electrical journals, however, are trying to work-up the enthusiasm necessary to an intensifying campaign. The station engineers and the sales staffs smilingly acknowledge the interest, but they know the difficulties better than some of their advisers.

Hiring and Depreciation.

In the same number of the "Electrical Times," there was an article on the "Hiring of Electrical Apparatus," which gave an account of the information collected on the subject from some important towns. Opinions differ; but, on balance, we think it may be fairly said that it is against hiring, except for such heavy goods as cookers and motors. The necessity of hiring is largely accepted; but the conditions appear to be repugnant to it. The British Electrical Federation

pretty well sums-up the position when it says that hiring electric apparatus is impracticable at present, owing to high cost, the financial position of many supply undertakings, and the heavy depreciation of apparatus. From several places one gets complaint that the high cost of maintenance is a serious matter. Stoke-on-Trent is one of such places; and from there the report comes that it is considered that those who have actually had to carry-out hiring "have not been by any means happy with the results achieved." Weston-super-Mare asserts that the apparatus is not reliable enough. Rhondda has had rather an unfortunate experience of hiring owing to the rapid obsolescence of apparatus. This same apparatus is that which several good-natured electrical men think should be dealt with on the hire-purchase system. In other words, they prefer to pass on to the consumers the trouble and the high cost of maintenance. Many refer to stiff prices impeding sales; while others, notwithstanding those prices and high maintenance costs, urge that rentals should be kept low. How it is to be done without loss is not explained. But we see that the Bournemouth undertaking charge 20 p.ct. on cost price. At Maidstone it is reported that there are 350 "pieces" out on hire, and the number is growing every week. It seems a long time since hiring-out of electrical apparatus started at Maidstone; so that the result is not a marvellous one. The same communication confesses that the business needs "vigorous canvassing and service to support it." We will leave it at that.

Retrospective Increases.

The Oswestry Electric Light and Power Company is one of those concerns that has felt acutely the difficulties of war and post-war times. They have been asking the Electricity Commissioners for power to increase their maximum charge per unit to 1s. 3d. This has been the subject of an inquiry by Col. T. C. Elkin. There was strong opposition by the Corporation and the Traders' Association. One of the points made by the former was that the price had already been increased from time to time beyond the maximum in the Provisional Order, and that it was feared the right to charge the maximum now sought would influence the price the Corporation would have to pay for the concern when the power matured in 1929 for acquiring the undertaking. The Company submitted evidence to show that their charges had only increased by 111 p.ct., while costs had risen by 244 p.ct. It was asked by the Company that the maximum sought should be made retrospective to 1918. This was a big and extraordinary demand; but it is interesting in view of the pronouncement made by the Commissioner. "That," he said, "is quite impossible. No order can be made retrospective." What does this mean? Are we to gather from it that the retrospective increases allowed by the Commissioners were illegal? We have not heard much about retrospective increases since the Kingston-on-Thames trouble.

Street Lighting.

The "Electrical Times" has published another interesting article on street lighting; and the statements it contains are not of the extravagant order. It points to the necessity of good street lighting in these days of motor traffic, from the point of view of safety alone. Often increased safety can be obtained for less than nothing. Take the case of gas—the replacement of badly regulated upright mantles by inverted ones can yield both economy and better lighting. Enhanced results can also be secured in the case of electric light by substituting modern lamps and fittings for the antiquated types that still cumber so many of our streets. A little capital outlay will increase the light three or four fold without adding to the running charges. The cost of street lighting is made-up of the following items: (*a*) Interest on capital expenditure. (*b*) Electrical energy. (*c*) Lamp renewals. (*d*) Lighting and extinguishing. (*e*) Cleaning. Item (*a*) must necessarily vary according to degree of alteration necessary to obtain efficiency. If it is a question of replacing gas by electric light, the item may be a serious matter on account of mains, services, &c.; but as the loan for these may be spread over a long period, it is not so formidable as it looks at first sight. In cases where the lamps are already supplied with electricity, the expenditure necessary to bring them to an efficient state is generally so small as to make the annual cost for capital charges insignificant. As to item (*b*) it is common knowledge that with the modern gasfilled lamp the efficiency depends largely on the size of the lamp; the high-power lamp being nearly twice as efficient as the small one. Regarding lamp renewals (*c*) the extra cost of gasfilled lamps is said to have been very much overestimated when such lamps are installed in suitable lanterns. Respecting (*d*) many devices are now available for lighting and extinguishing automatically—by time switches, superimposed pressure waves, &c. As to cleaning (*e*) this is probably the most important detail for efficiency. Dirty lamps and reflectors mean a loss of light of upwards of 50 p.ct. In cases where cleaning is methodically carried out at stated intervals, a loss of 15 to 20 p.ct. is the maximum incurred.

Will of Mr. William Cowan.—Mr. William Cowan, of Marlborough Road, Bournemouth, of No. 2, South Terrace, York Place, Harrogate, and of Edinburgh, gas-meter manufacturer, a Director of Messrs. Parkinson and W. & B. Cowan, Ltd., who died on Feb. 18, aged 89, left personal estate in the United Kingdom valued at £70,011.

SILICA RETORTS.

A RECENT number of our French contemporary, the "Journal des Usines à Gaz," publishes some interesting facts and comparisons as to the working of "Bluebell" 95 p.ct. silica retorts made by Messrs. John G. Stein & Co., of Bonnybridge. The information was furnished by the Liverpool, Tottenham, and Blackburn gas undertakings.

At Liverpool, a setting of six (the retorts are made in segments and jointed with ordinary silica cement) was put to work in January, 1919, and has functioned continuously since then; the Engineer stating that their condition suggests another two or three years' life. Up to March this year, no repairs had been necessary; and it is considered that, over a period, the 31 p.ct. of extra installation cost of these retorts would be more than off-set by the negligible maintenance expenses. The extent of scaling in the silica retorts is about the same as in fireclay; and no difficulty is anticipated in stopping leakage at the segment joints—if any asserts itself. The retorts are built-in with silica bricks and cement up to the bottom of the middle stage, above which point fireclay is used.

Tottenham report that they have had a setting of the Bluebell retorts working since last November, a period too short for any definite appreciation. The cost to the Company was 20 p.ct. more than for a fireclay setting. The Engineer considers silica clay would be suitable for patching. Not only in silica retort-beds, but also for ordinary fireclay retorts, he prefers to use silica bricks throughout the combustion chamber. The higher conductivity of silica facilitates more rapid and thorough distillation; and the setting is worked at 1350° C.—about 50° C. above the usual temperature.

The Engineer at Blackburn, speaking from experience at that station and in Scotland, maintains that the extra cost of silica retorts is fully justified; that a 25 p.ct. increased output is attainable with them. They should be worked at a higher temperature; and the conductivity of a refractory containing 95 p.ct. of silica is 16 p.ct. greater than that of fireclay. They are more economical, in spite of their market price and the more costly setting work entailed.

Referring to a setting at Falkirk designed for nine retorts, he states that the demand there at the time of building necessitated crowding-in twelve, which resulted in the three retorts next the generator deteriorating rapidly, and giving rise to endless trouble through buckling—to such an extent that in a short time it became impossible to discharge them by machine. A year-and-a-half was their average life. Accordingly, silica retorts were substituted for the three, while the upper nine remained fireclay. After two years the latter were buckled and worn to such extent as to necessitate replacement, while the three silica ones were sound enough to leave. This time the silica again stood as long as the new fireclay retorts—until the setting was let-down for rebuilding.

The scale is easier to remove from silica retorts than from fireclay, and much trouble is thus eliminated. In joining-up the segments of the retort, it is advisable to allow space for expansion at the extremities of each section. They should be so arranged that the joint is covered by a transverse wall of the setting, by which means they become tight after two days' working. Fireclay retorts are harder to keep gas-tight than silica ones, for the reason that more science and accuracy is expended in the manufacture of the latter. If any leakage does occur, it may readily be stopped with a mixture of the powdered silica employed in setting the retorts. It is essential that the arch of the combustion chamber should be of 95 p.ct. silica; in fact it is the best practice to use silica for all parts upwards of the generator nozzles.

German Exhibition.—A correction is necessary in our notice (on p. 102 of the "JOURNAL" for April 12) of the forthcoming annual meeting and exhibition of the German Gas Association from June 26 to 28. It will take place at Homburg, not at Hamburg, as stated.

Southern Association of Gas Engineers and Managers (Eastern District).—The next meeting of the Eastern District of the Southern Association will be held at the gas offices, Addington Street, Margate, at 5 p.m. on Thursday, May 25. All Western members are cordially invited to attend.

"Transactions" of the Institution of Gas Engineers.—A bulky volume indeed is filled by the "Transactions" for 1920-21 of the Institution of Gas Engineers, a copy of which is to hand from the Secretary (Mr. Walter T. Dunn, F.C.I.S.), by whom the book has been edited—a task which must necessarily have involved a large amount of work on his part. It contains a report of the joint meeting in June, 1920, with the Institution of Electrical Engineers, and of the annual general meeting last October of the Institution. There is a portrait of the President for the period from June, 1920, to October, 1921 (Mr. Thomas Goulden). Mr. A. V. Hendrickson furnishes a number of useful abstracts of papers relating to gas manufacture that were published in various periodicals, &c., during the twelve months ended June last. The memoirs at the end of the book unfortunately have to record the loss of some valued members of the profession. Altogether the volume extends to over 800 pages, and is tangible evidence of the activity both of the gas industry and of the Institution which is at its head.

A JUBILEE.

Mr. Robert W. Wilson's Service with the I.C.G.A.

A brilliant gathering assembled at the Savoy Hotel last Wednesday evening for a banquet given by the Imperial Continental Gas Association. The occasion was to celebrate the completion by Mr. Robert Wilson of fifty years' service with the Association; and over seventy of his friends and their ladies came—many from abroad—to honour his past work and to wish him God-speed in the future. He received his first appointment with the Association on April 13, 1872, and now, on retiring from the Secretaryship, has accepted a seat on the Board.

On April 13 Mr. Wilson was the recipient of an illuminated address from the staff of all stations of the Association; and his large post bag, containing felicitations from every corner of Europe, included many letters from workmen who have long since left the Association's employment. At the banquet he was presented by the Board with a beautiful old-silver cup, and by the staff with an antique silver tray, a set of entrée dishes, and a magnificent album (specially executed for the purpose) containing photographs of past and present members of the staff. A testimonial fund was raised for these latter gifts; and the wide interest taken in this unique anniversary may be judged from the nature of the contributions, which included: 875 Austrian crowns; 6115 Belgian francs; 1902 French francs; 2436 German marks; 490 Dutch florins; 360 Hungarian and 1238 Czecho-Slovakian crowns; and £105 sterling. The anniversary was fittingly celebrated at all the stations abroad by the award of a paid half-holiday on April 26 to every employee.

The function was an unqualified success from start to finish, and reflected great credit on all responsible for the arrangements. On arrival, the guests were received by Sir Charles and Lady Jessel. With the Guest of Honour and Mrs. Wilson were Mr. and Mrs. R. J. W. Wilson, Mr. W. Wilson, Mr. and Mrs. P. J. Bird, and the Misses Wilson. Sir Charles (who presided at the banquet) and Lady Jessel were accompanied by Mr. G. Jessel, Mr. R. Jessel, and the Misses Jessel; and among the company were: Col. H. Le Roy-Lewis, C.B., C.M.G., D.S.O. (Deputy-Chairman) and Mrs. Le Roy-Lewis, who brought the Misses Le Roy-Lewis; Sir Henry Birchenough, Bart., K.C.M.G., who brought Miss Joan Lucas; Mr. H. G. Newton; Mr. and Mrs. H. G. Palmer; and the Rt. Hon. Sir Guy Fleetwood Wilson, G.C.I.E., K.C.B., K.C.M.G. Among those from the London headquarters staff were Mr. F. H. James (Secretary) and Mrs. James; Mr. W. E. Bowers (Assistant Secretary) and Mrs. Bowers; Mr. H. F. Andresen (late Assistant Secretary); Mr. F. J. Mourilyan, late head of the travelling auditing staff; Mr. W. M. Jackson, Accountant; Mr. W. P. Hinman (Registrar) and Mrs. Hinman; Mr. G. C. Lambert; Mr. Dendy Marshall (Auditor) and Mrs. Dendy Marshall; Mr. C. Wigan (Solicitor) and Miss Wigan; Mr. T. W. W. Melhuish, late Consulting Electrical Engineer. The following represented the stations abroad: Austria—Dr. L. Teltscher (empowered representative) and Mrs. Teltscher. Belgium—Antwerp, Mr. A. F. P. Hayman (Manager) and Mrs. Hayman; Mr. Brender à Brandis, late Manager; Mr. R. Van den Abeele, Agent and Political Representative. Brussels, Mr. H. de le Paulle (Manager) and Mrs. de le Paulle. Czecho-Slovakia—Mr. W. Friebel (Manager at Prague and the Czecho-Slovakian stations) and Mrs. Friebel. France—Mr. Paul Couvreur (General Manager of the Compagnie Continentale du Gaz en France) and Mrs. Couvreur. Germany—Mr. Carl Joerger (empowered representative) and Mrs. Joerger; Mr. L. Körting (late Manager at Hanover), who came despite his 87 years; Mr. Ernst Körting (late Manager at Berlin) and Mrs. Körting; Dr. W. L. Drory, late Engineer at Frankfort; Mr. E. J. Hutchence, late Engineer at Hanover and now of the Gas Light and Coke Company; Mr. E. Thompson (late Engineer at Berlin and Manager at Aix la Chapelle) and Mrs. Thompson. Holland—Mr. J. G. Van Niftrik, Manager at Flushing.

On arrival, Lady Jessel and Mrs. Wilson were presented with bouquets by Mr. Hayman on behalf of the staff. Seventy-five in all dined, and it was pleasant to discover that the menu and programme included an autographed photo of the chief guest. Each lady received a charming spray of flowers.

After dinner, the Loyal Toast having been honoured,

The Chairman said: Ladies and gentlemen, This is a very great occasion, and perhaps in any circumstances I could hardly hope to rise sufficiently to it; but I trust that in view of a very bad cold and a rather choky wind-pipe, you will excuse me perhaps for not coming up to your expectations. We have assembled you to-night from all parts of the I.C.G.A. world for one—and only one—purpose, and that is to do honour to my old friend and new colleague, Robert William Wilson. (Applause.) In the course of my life I have known people who have attained success by brain power alone; I have known people who have attained success by force of character; and I have known people (we have even had examples in the I.C.G.A.) who have attained success in life by the exercise of tact. In Robert William Wilson we have this trinity of powers united in one man [Hear, hear]—great brain power, great force of character, and wonderful tact. Now, ladies and gentlemen, the occasion to-night is to celebrate his jubilee; his fifty years of service in this Association. We have had (as you all know) many others among us who have attained fifty years of service in the Association. We, however, have had nobody who, during those years, has served us for no less than 26 years as Secretary; and I need hardly remind you what this now considered humble title of Secretary means in the Imperial Continental Gas Association. We are an old Association dating far back in the early years of the nineteenth century, somewhat near the Congress of Vienna, when Lord Castlereagh was designated by Talleyrand as the most distinguished of all by the absence of distinctions. We may say that the Secretary of the I.C.G.A., untrammelled by the titles of manager or general manager, or any of those things, remains the most distinguished of all secretaries in the City of London by that title alone. [Hear, hear, and laughter.] If I had to detail at length to you the obligations which the Association is under to Mr. Wilson, if I had to detail to you the many services (some of them even at the risk of his life) which he has undergone for the Association, I am afraid we should all be turned out of this building long before I had finished. You all know him; you all know what he means to you. Besides the qualities I have detailed to you I think the one that appeals to us most is the human side of him. [Hear, hear.] In the words of Terence he could say *Homo sum; humani nihil a me alienum puto;* and I think that this is what particularly appeals to us in Wilson—the wonderful interest which he takes not only in everything that appertains to the I.C.G.A., but to all of us who are members of that Association. I remember very well years ago hearing Oscar Wilde say "Nobody takes any interest in me except my doctor, and he is paid for it." (Laughter.) I have known Wilson take an interest in my ailments—he is even taking an interest to-night in my ailment. I know he takes an interest in the ailments of my wife and my family. I have known him take an interest even in the health of my gas-cooker—(loud laughter)—and I have also heard him—strange, and above all things—take an interest in my super-tax. (Renewed loud laughter.) It is therefore, ladies and gentlemen, for these reasons, and the other qualities which I have enumerated to you, that he has gained, besides our admiration, besides our respect, our affection and our love. (Loud applause.) Well, ladies and gentlemen, I will not detain you any longer for the reasons that I have already given you—physical incapacity—but I will at once proceed to the task that I have before me, which is, on behalf of the Directors, to present Mr. Wilson with this cup. (Loud and prolonged applause.) I have got a personal interest in this cup, because I and the Vice-Chairman chose it, and therefore if anything is said against it I shall be offended. (Laughter.) I may mention, however, to those of you who are not perhaps judges of objects of art in the way of silver, that it is a cup that is 203 years old. It dates from 1719, and it belongs to the very best period of old English silver. In other instances, where one of our staff has reached the fifty years period, we have given (and I have been deputed on more than one occasion to choose it) a gold watch. It did not require much choosing. I was always given a certain amount of money to spend, and I went to a shop and tried to spend that sum; but when his time approached, Wilson was in fear and trembling of having a gold watch. (Loud laughter.) He said to me "Above all things for God's sake do not give me a gold watch." (Renewed laughter.) By dint of a very slight cross-examination, I elicited his reason. It was that he already had one, and not only a gold watch, but one that had been given to a member of our staff for fifty years' service which he had rescued from a pawnshop. (Loud laughter.) I cannot help thinking that the hint about the watch and the pawnshop must have been given him by our old departed colleague and friend Mr. Salomons, who was a wonderful man for picking up bargains. As you see, instead of a watch, we are presenting him with this silver cup. One of the reasons that it especially appealed to me was that it was not particularly large, and that he might put it, without any ostentation, on his dining-room table, and look at it every day and every evening and say to himself: "That was given to me by my old friends the Directors of the I.C.G.A." Mr. Wilson, I beg to present to you, on behalf of my colleagues, this cup.

The cup was then handed to Mr. Wilson amid hearty applause.

Mr. Hayman: Ladies and gentlemen, We have just listened to the eloquent tribute which our esteemed and distinguished Chairman, Sir Charles Jessel, has paid on behalf of the Board to him who is the central figure in this remarkable gathering, but there remains still an equally important duty to fulfil, and that is to pay the tribute which is owing by the staff. This is indeed an unique occasion, in that we see gathered round this table to do honour to an old friend and colleague so many of the past and present members of the staff both in London and from the various countries abroad in which the Association is, and has been, working, among whom are some bearing the most honoured names for ever linked with the history of the I.C.G.A., and one veteran—one of the grand old men of the I.C.G.A.—whose name has long since been inscribed on the golden records of the Association, to which the name of Robert William Wilson has now been added. As senior member of the active staff of the Association, the pleasing duty has devolved upon me of offering you, Mr. Wilson, on behalf of the whole of the staff, past and present, both in London and on the Continent, our most hearty congratulations on your completing fifty years' service with the Association. (Applause.) Words almost fail me to give adequate expression to the feelings of esteem and regard which we all feel in our hearts for you, Mr. Wilson. All will, I know, bear me out in saying that we can never cease to remember the kindly interest which you have always shown in our welfare, and, from the highest to the humblest and remotest employee, they desire through me to express our most grateful appreciation of the services you have rendered to us all. (Prolonged applause.) It is almost superfluous to say, so well-known is the fact, that the members of the staff in London who have been brought into daily and close contact with you have the highest admiration for your abilities and your high personal character, which have endeared you to them all; and they esteem it a privilege that they have been able to work under such a chief, whose example they will be proud to follow. [Hear, hear.] We in the various countries abroad, though further removed, have equally felt the influence of your magnetic personality. We equally appreciate those rare qualities for which you are so justly distinguished, and those agreeable official relations which it has always been your aim to maintain. Your services are recorded with us "where every day we turn the leaf to read them," and, in turning, we find there how faithfully the Board's instructions have been conveyed to us, and how often, whenever difficult problems had to be grappled with, our task

has been greatly facilitated by that clear reasoning, by that complete mastery of the subject, by that practical common sense, combined with great tact, which you have always shown. These written testimonies of your great gifts will remain in all countries as a monument to the splendid work which you have done on behalf of the Association. (Applause.) It is a matter of extreme regret to us all that the close official relations between you and ourselves have now ceased to exist. We shall miss that fine penmanship; we shall miss that familiar signature. (Laughter.) We rejoice to think, however, that these relations will still be continued with the Association; that your services will still be retained for the dear old I.C.G.A., which you and we love so well; and that you have now taken your seat on the Board, where your long experience and inside knowledge of the history of the I.C.G A. (extending over more than half of its existence) will, I feel sure, be greatly appreciated by your eminent colleagues. [Hear, hear.] Tradition is a great factor in the Association, and you, in your capacity as Secretary, have been the living embodiment of, and have yourself enhanced, those traditions which you are now handing down to your successors. *Servo et consumo alteris*—I watch and I consume for others. Such is the motto that a celebrated archæologist discovered years ago engraved on an ancient lamp of the catacombs. No motto could better apply to you, Mr. Wilson. It characterizes in a striking fashion all your life of incessant work and unwearying devotion. You also have watched over, without ceasing, this Association. You, also, have consumed without counting the cost, and with an admirable abnegation, the best of yourself for the good of all. Ever ready to stretch out a helping hand whenever the need arose, we can never forget the assistance you rendered to, and the kindly solicitude you showed for, all those who were compelled to become refugees in this country at the time of the war, and those who had the misfortune of being prisoners of war or interned, and who were constantly in your thoughts, as also were those who were so ably carrying on the work of the Association in circumstances of great difficulty. We also think of that hearty welcome you were always ready to extend to any of the staff who came to see you in London, and, as it sometimes might happen, if any of us felt downhearted for some reason or another, we invariably went away feeling our spirits revived by that cheery optimism which has always characterized you, and which has been such a great asset to the Association all through your career. [Hear, hear.] Like the ancient lamp of the catacombs, you are for us an emblem and an example. The younger members will derive inspiration from your great past; while we older ones are proud to have been able to work with you. Can you therefore wonder that, immediately it was known that this auspicious event of your jubilee was so near at hand, the members, past and present, of the staff in London and on the Continent, wherever the Association is or has been working—and here I must not omit to mention the widows of some of the distinguished and devoted officers of the Association—with an unanimity which was remarkable, hastened to make known their intention of participating in this manifestation of esteem and regard for your person, and expressing at the same time their cordial sympathy in the object we had in view in grateful recognition of the big services you have rendered them. It would hardly be possible to quote here from the letters we received all the affectionate terms in which they spoke of you; but suffice it to say that no better proof could be given of the popularity you enjoy throughout the staff. At all the stations of the Association to-day, this auspicious event is being celebrated by the staff and workmen—they are all with us here in spirit. One rather interesting fact I should like to mention, and it is this: The members of the Association's band in Antwerp had suggested to me that they would have liked to come over to London to serenade you in person at your office. It was thought, however, that the London police might have something to say in the matter, and might have raised some objections to the disturbance it would cause to the traffic in London Wall; but they are doing the next best thing, and are serenading you in the spirit to-day before the Association's offices in Antwerp. I have now endeavoured to give voice, to the best of my ability, to all that we feel in our hearts. But we desire further to give you some tangible and enduring token of our esteem and affection for your person; and I have now the pleasing duty, on behalf of the whole of the staff, to ask you to accept this set of antique silver ware. [Loud Applause.]

The CHAIRMAN (examining the tray, which constituted one of the pieces): It is one of the most beautiful trays I have ever seen of old silver. You could not find a better one.

Mr. HAYMAN (continuing): Sterling metal seems to be the most appropriate tribute to sterling worth. Therefore, the expression of our feelings to you has taken this shining form. At the same time it was thought that an album might be acceptable to you, containing as it does the portraits of over 100 past and present members of the staff from every country served by the Association [Hear, hear]; and as you from time to time turn over its pages, may it serve to remind you of all those who have been connected with you in the course of your long career in serving this great Association, and who esteem themselves proud to look upon you as a true and loyal friend. This album, wrought by one of the finest craftsmen on the Continent and inscribed in the famous characters of Plantin, one of the glories of the City of Antwerp, contains the following dedication:

Presented
to
ROBERT W. WILSON, ESQ.,
Secretary
of the
Imperial Continental Gas Association
by
Past and Present members of the Staff at home and abroad
on the occasion of his completing 50 years' service with
the Association in token of their esteem and affection and
of their high appreciation of the kindly interest he has
always shown in their welfare.

May this souvenir prove to you that, among the members of the staff, gratitude is no idle word. Our sincerest wishes for health and happiness accompany you on your retirement from your arduous duties of Secretary, and that for many years to come you may be able still to serve the Association as a Director and to devote yourself to your family, of which you are the revered head, and to those pursuits in which you have hitherto been accustomed to find relaxation and enjoyment during your leisure hours. Gentlemen of the staff, I ask you to honour Mr. Wilson in the usual way.

The toast was given by all those present, accompanied by singing "For he's a jolly good fellow."

Mr. WILSON (who evinced considerable emotion) said: Sir Charles Jessel, Mr. Hayman, Ladies and Gentlemen, You may well imagine that this is a proud day for me and mine, and I and they are very proud, exceedingly happy, and profoundly grateful. Never in my life, or in my wildest flights of imagination—and I have taken many—have I pictured to myself such an entrancing evening as this—a scene in which all the characters are, in one way or another, connected with the Association. Many of them come from very distant parts of the Continent, and all with one, and only one, purpose, and that is to do me honour. I cordially thank all of you for your presence to-night, and the Directors for having arranged this splendid evening. I should also like to thank Mr. Hayman, Mr. James (my successor), Mr. Bowers, and others who have carried out so well the wishes of the Board. Sir Charles Jessel and Mr. Hayman have accorded to me a far greater meed of praise than I really deserve. [No, no.] Any merit that I have acquired in my position as interpreter between the Board and the Staff is due to the wisdom of the Board—to the wisdom and generosity of the Board, I should say—and to the loyalty and able assistance rendered by the staff. Without this assistance, I certainly should have been an utter failure; and I desire that the praise which has been so liberally bestowed upon me should be distributed over the organization which has rendered this co-ordination possible, and the results so successful. I have been well rewarded—more than well rewarded—for any services I have rendered by the greatest honour that could be bestowed on anyone, however long and meritorious his services may be. A seat on the Board has been bestowed upon me; and I am happy to think that I may still be able, perhaps, to render some little service to the dear old "I.C.G.A."—the grand old institution which I have now served for fifty years. For these magnificent presents I thank the donors most gratefully, and with a very full heart. Whenever I look upon them I shall recall this scene; and they will serve as heirlooms in my family. I have only one other word to add, and that very short. But I think it may interest and amuse you to hear how I first entered the Association. I was a pupil at Christ's Hospital. At the beginning of 1872, I was told I should have to leave at Easter; and the momentous question then arose as to how I was to get a living. My father knew Mr. Phillip Twells, who was at that time Chairman of the Association; and he rather expatiated upon my knowledge of languages. I had only been learning German six months, and French a little longer [Laughter]; but I happened to take first prize in German. I received a letter from the Secretary at that time, Mr. Albert Jackson, to call at the office on a certain Wednesday. It happened to be a Board day—all Wednesdays were Board days then. I came in my Christ's Hospital clothes (long blue coat, yellow stockings, and bare head); and I was shown into the Secretary's room. He said: "My boy, I am busy with the Board; but I have got two letters for you to translate—one French and one German." I made some sort of show of the French one; but the German one was written by Dr. Woelffer, an octogenarian, who wrote in German characters with a quill pen. [Laughter.] I looked at this letter with fear and horror, and could hardly make out a word of it; so what I did was this: I wrote on a slip of paper "I have to be back at school by 2 o'clock." [Loud laughter.] On my way back to school, I thought what a fool I had made of myself, and that I had lost any possible chance that I had. About three weeks went by when I received from the office an envelope full of German letters written in all sorts of characters. That shows that Albert F. Jackson had a humorous side to his character. He was an Irishman with a long yellow beard; and he was always known as "I.C.G.A.," I can't get away—presumably because he always went away very early. I eventually left school, and was a fortnight at home reading up German. Then I made up my mind I would get a berth for myself. I looked through the advertisement colums of the papers, and saw one from a large leather warehouse in Stepney or Poplar, or some place like that, for a junior clerk. I saw the principal and he said: "Can you write well?" I replied, "I think so, Sir." He then said: "Can you write a letter?"; and I replied, "I believe so." He said: "Sit down and write a letter." So I sat down and wrote a letter, and took it to him. He said, "You are engaged at £25 a year; and you can come in on Monday." [Laughter.] That was a Friday, generally an unlucky day I believe for sailors; and my father was a sailor, and his father before him. I went home, and by the last post that night I got a letter from Clement's Lane saying: "Turn-up here at 9 30 to-morrow morning." I turned-up; and I also did them a French and a German letter which the Secretary gave me to do. He looked at them and said: "That will do. Come on Monday. Salary, £60 a year." [Renewed laughter.] You can imagine that I was naturally a little bit elated; and I did not turn-up at the leather factory or warehouse on the Monday. I turned-up at the "I.C.G.A.;" and there I have been ever since. I got a letter from the other firm. But the office was good enough to write and explain the situation; and they thought that in the circumstances I was justified. I have been more than justified. I have had the best time during the past fifty years that any man could have experienced. I have had on every side kindness, willing help, and everything that could conduce to make my duties light and pleasant. Friends all, I thank you most heartily.

Mr. Wilson's speech was received with acclamation.

After these most happy speeches, the company withdrew to the lounge, where they had an opportunity of personally congratulating Mr. and Mrs. Wilson and of seeing the presentation silver they had received. An entertainment by talented artistes concluded a delightful evening.

Cornish Association of Gas Managers.—Mr. William Nicholls, General Manager and Secretary to the Penzance Gas Company, has been nominated President of the Association for the year 1922-23, and has consented to accept the office

GAS-FIRED BRICK KILNS.

The firing of brick kilns by producer gas was the subject of a discussion at the annual meeting of the Institute of Clayworkers, held at the Building Exhibition, Olympia, on Monday, April 24.

Dr. J. W. Mellor (Principal of the Central School of Science and Technology, Stoke-on-Trent), in introducing the discussion, said that a great many of the complaints with regard to the inefficiency of producers were due to the burning of the fuel being carried too far. As illustrating the difference between the heat value of producer gas from coke and coal, he said that 1000 c.ft. of gas produced from coke contained about 65,000 heat units, whereas the same quantity from coal contained 81,000 heat units. With regard to heat losses, if the producer gas were made some distance from the kiln to be fired, something like 30 p.ct. of the heat value was lost through the cooling of the gas; but if it were made near, so that it could be passed direct into the kiln, they would not get this loss. He mentioned a scheme in which a producer was mounted on a wagon and moved about from kiln to kiln, as desired, in order to save this loss. Then there were other losses in the kiln. The loss through the heating of the excess air amounted to 4 cwt. per ton of the original fuel; flue gases accounted for 3·25 cwt.; and the cooling of the bricks for 4·36 cwt. He illustrated a number of kilns to show various methods adopted of utilizing this waste, on the continuous firing system. On the whole, he did not think the claims made by those advocating gas-firing systems were at all fair. Some of the claims were to the effect that 50 or even 80 p.ct. could be saved in fuel consumption as compared with ordinary systems. He believed he would be safe in questioning whether gas firing effected any saving at all, if a fair comparison were made. The advantages of gas firing, however, were that the supply could be more easily regulated than other systems; and it also made for cleanliness. Indeed, he admitted that if he were a manufacturer he would have a slight prejudice in favour of it, because he liked the look of it. Silica brick manufacturers had said that gas firing could not be used successfully for silica bricks; but he did not believe this was right. They might have tried in the past, and failed. He did not know of anything in the firing of silica bricks with coal that could not be duplicated with gas firing—as well as, or perhaps better. But they would not save fuel.

Mr. S. H. Wragg said that he had a Shaw kiln, gas-fired, which was used for burning white glazed bricks, sanitary ware, &c. He did not think that there was a continuous coal-fired kiln in which they could successfully burn white glazed ware. A continuous gas-fired kiln effected a very considerable saving in fuel, and also in labour; and his kiln was working at less than half the fuel cost of the coal-fired installation, while the output was fully maintained.

Dr. Mellor said he had emphasized the necessity of comparing a continuous coal-fired kiln with a continuous gas-fired kiln, whereas he understood that Mr. Wragg was comparing continuous gas with intermittent coal.

Mr. Wragg asked whether there was a continuous coal-fired kiln that would fire white glazed ware successfully.

Dr. Mellor replied that he did not know of one.

Mr. P. M. Stewart said he had, before the war, investigated abroad the possibilities of gas firing for common bricks, and had come to the conclusion that there was really nothing to warrant the outlay on the conversion of existing continuous kilns. There was a future for gas firing in connection with tunnel kilns for common bricks. There, however, it was not a question of the saving of fuel, but of labour.

Town Gas Manufacture.—We have received from Messrs. Isaac Pitman and Sons, Ltd., a small handbook entitled "Town Gas Manufacture," by Ralph Staley, Engineer and Manager of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company. The title page describes the book as a practical introductory treatment of the equipment and processes of an average gas-works, for students, junior gas engineers, and others connected with gas-works. The published price is 2s. 6d. net. After reading the book, we hope to take an early opportunity of making further reference to it.

An Important Dye Discovery.—Something in the nature of a revolution in the dyeing industry, says "The Engineer," seems to be indicated in the announcement made by Prof. A. G. Green regarding the properties of the ionamine dyes that have recently been discovered by the laboratory staff of the British Dyestuffs Corporation. These dyes are the outcome of a research into the dyeing of acetyl silk—a strong and beautiful form of artificial silk produced by the British Cellulose Company, the manufacture of which has hitherto been impeded by the difficulty of dyeing it in fast shades. The new dyes are stated to have a peculiar affinity for acetyl silk, but to be without effect on cotton. Consequently, a mixed fabric of cotton and acetyl silk can be treated in a single bath composed of an ionamine dye and another such as chlorazol blue, which has an affinity only for cotton, with the result that each fibre will select its own dye. It is possible, too, by subsequent chemical operations, still further to modify the final colour state of the fabric as a whole.

A CARBON MONOXIDE INDICATOR.

A description of some tests of an iodine pentoxide indicator for carbon monoxide is given in the April issue of the "Journal of Industrial and Engineering Chemistry;" the authors being Messrs. S. H. Katz and J. J. Bloomfield, of the Chemical Division of the Pittsburgh Experimental Station of the United States Bureau of Mines. It seems that the "Hoolamite" or activated iodine pentoxide indicator for carbon monoxide, referred to in the article, is frequently used by engineers of the Bureau of Mines engaged in mine-rescue and recovery operations; and the tests described were made to determine its accuracy. "Hoolamite" is a mixture of iodine pentoxide and fuming sulphuric acid on granular pumice stone. In contact with carbon monoxide, it changes, owing to the liberation of iodine, from the original white to increasing depths of bluish green, then violet-brown, and finally black, depending upon the concentration of carbon monoxide. The indicator consists of a tube of activated charcoal, through which gas is drawn by means of a rubber hand-bulb. It then discharges through a small glass tube containing "Hoolamite." The charcoal removes any gas (other than carbon monoxide) which may produce a false test, unless present in large quantity. Interfering dusts and mists are stopped by cotton-wool filters, after the charcoal and before the "Hoolamite." Five permanent colours on pumice stone are placed for comparison in a sealed glass tube alongside the "Hoolamite." In using the detector, the bulb is squeezed three times, the tube of "Hoolamite" is inserted, the the bulb is squeezed ten times more, and the carbon monoxide is estimated. Should the colour be indistinct, twenty squeezes are advisable. The carbon monoxide is then placed at half the corresponding shade for ten squeezes. No failures to indicate occurred at higher concentrations in air than 0·07 and 0·08 p.ct. Determinations are easily made in less than a minute; and no skill is required. Only one person in thirty has been found to have difficulty in determining the colour shades. The instrument is, it is added, proving a valuable aid in mining work, and for testing air round blast-furnaces, gas-producers, water-gas and coal-gas plants, and other places where carbon monoxide occurs. It may also be used to promote furnace economy by indicating carbon monoxide in flue gases.

German Benzole for the Entente.

The German authorities have, according to "Das Gas- und Wasserfach," expressed themselves willing in principle to dispense with the order making benzole extraction compulsory, provided that the delivery under the Peace Treaty of 36,000 tons annually to the Allies, which necessitated the order, can be assured by other means. The authorities have suggested a voluntary arrangement between all producers of benzole, by which the quantity should be guaranteed. The "Wirtschaftliche Vereinigung," which is an association for marketing gas-works bye-products, is in treaty with the works concerned, and has reason to hope that the requisite arrangement can be arrived at. In this they have been informed that they may count on full support from the Ministry of Commerce, which, failing a general agreement being reached, will be compelled, in conjunction with the "Wirtschaftliche Vereinigung," to arrange for the requisitioning of benzole from works which stand out.

"Sandvik" Flexible Steel Belt Conveyors.

The Sandviken Steel Works in Sweden some twelve years ago began to make flexible steel belts to be used for conveying purposes in various industries, where they have met with decided success. According to an article by Mr. Harry Carlson, of New York, in the "Gas Age-Record," these "Sandvik" belts are made from the very best Swedish charcoal steel, with a percentage of carbon of about 0·65, cold rolled, and hardened and tempered by a special process originated at the works named, and perfected after many years of experiment. To date about 1300 installations have been made for handling coal, coke, and many other materials. The "Sandvik" belt has a specially hard, smooth, and dense surface, which is said to account for its great durability and high wear-resisting qualities. The manufacturing process also imparts properties that make it particularly adapted for conveying hot material. It is remarked by the author that, as compared with flat rubber belts of the same width, the steel belt possesses greater transverse rigidity, and therefore a higher capacity, as the edges, even with a one-sided load, do not yield in a downward direction. This allows a relatively broader part of the belt to be used for carrying the load. Again, in the case of a steel belt two-thirds of the width may be used without danger of spillage, on account of the fact that it runs so smoothly. A special feature is the remarkable ease and simplicity with which material can be discharged at any desired point along the conveyor, without the use of cumbersome and expensive trippers. The belt does not stretch, and the tension devices are therefore very simple, as they only have to take-up trifling variations in length, caused by changes of temperature.

National Association of Technical Gas Officials.—The Acting Secretary (Mr. A. Mason) intimates that the annual general meeting of the Association will be held on Thursday afternoon, June 22, at 3 o'clock, at the Institution of Electrical Engineers.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

HALF-YEARLY MEETING AT LEIGHTON BUZZARD.

MEMBERS assembled in goodly numbers last Wednesday at Leighton Buzzard (the home of their President, Mr. H. G. Ruggles, who is Engineer, Manager, and Secretary there) to hold their half-yearly meeting. It was their third visit to the town, and as on the two previous occasions, the welcome extended to them was of the most cordial character—a welcome that was, in addition to the President, taken part in by Mr. R. Richmond, J.P., C.A. (the Chairman of the Company), who was an old friend, and Messrs. G. Garside, J. H. Green, and W. Gravely W. Willis (Directors).

THE GAS-WORKS.

A pleasant time was spent inspecting the gas-works and admiring the adjacent rock garden and general surroundings. The works (which have been three times built on different sites) have grown from very small beginnings to the modern and well-equipped condition in which they now are. From a souvenir brochure prepared for the occasion, it was learned that the Company was formed in 1835; gas being introduced into the town in the same year. The original capital was £2500, divided into 125 shares of £20 each. The prospectus (which was included in the brochure) stated that "the appropriation of the shares shall be confided to the Directors, who shall give preference in such appropriation to consumers of gas." The present capital (less premiums and amount added on conversion) is £39,857, or £517 per million c.ft. of gas sold. In 1836 the price of gas was reduced from 15s. to 14s. per 1000 c.ft.; and the first dividend of 2 p.ct. was declared in 1837. By 1914 the price had come down to 2s. 10d. per 1000 c.ft., from which very low figure circumstances in 1921 necessitated its increase to 5s. The quantity sold in 1884 was 18 million c.ft., and in 1921 77 millions. The Company were one of the earliest to adopt the calorific power basis; and their standard price of 2s. 10d. per 1000 c.ft. was one of the lowest in the country.

The Company have their own sidings from the London and North-Western Railway into the works; and coal is delivered direct into store—the wagons being handled by means of a capstan driven by a gas-engine. The present gas-making plant consists of eight regenerative settings of 10 ft. horizontal retorts, hand-machine charged, and a Dellwik carburetted water-gas plant of a capacity of 120,000 c.ft. per day. The annular condensers, tower scrubber, and washer-scrubber are of ample capacity; and there are two sets of exhausters of 20,000 and 15,000 c.ft. per hour. Of the three boilers, one is fitted with Turbine furnaces and Fergusson superheater, and the others with Meldrum furnaces. There are six purifiers, 16 ft. square by 5 ft. deep, with Weck centre-valve; and the station meter is of the Rotary type, having an hourly capacity of 20,000 c.ft. The Parkinson and Cowan station governor has 12-in. connections; the pressure being controlled by an automatic pressure changer supplied by the same firm. No. 1 gasholder, of 70,000 c.ft. capacity, is used as a carburetted water-gas relief holder; and No. 2, of 180,000 c.ft. capacity, for mixed gas. The sulphate plant is of 10 cwt. per day capacity; and there is a tar dehydrating plant adapted from a disused benzole recovery apparatus. The distribution mains measure 25 miles.

The compressing plant (which was subsequently referred to by Mr. Ruggles in his Presidential Address) consists of a Reavell compressor, of 12,000 c.ft. per hour capacity, steam driven, feeding into a receiver at 20 lbs. per sq. in. pressure. Until recently, the whole of the district was supplied by the mains going through the centre of the town. By their 1914 Act, however, the Company extended their limits of supply to take in various additional parishes, though of these gas at present has only been taken to Wing. When the supply was extended to Wing in 1915, a booster was installed at the works, and gas supplied at 16 in. pressure through a 5-in. steel main. The estimated consumption in Wing was 2 million c.ft. per annum; but this increased to 5 millions last year, so that it was impossible to maintain a satisfactory supply. The pressure in other outlying parts was also inadequate. Hence the high-pressure installation.

Another feature in which much interest was shown (and which the President also described in his address) was the small vertical retort unit known as the "Adaptable," which is now in course of erection. This plant is a new introduction of Messrs. E. J. & J. Pearson, of Stourbridge, and will consist of two vertical retorts having a capacity of 4 tons per day. It is situated in part of the coal-stores. In order to obtain the necessary height for the plant, part of the roof had to be removed, and a portion of the existing walls at one end and side raised. The roof principals will be refixed. The coal will be emptied from the wagons into a breaker-pit, and a bucket elevator will raise it into an overhead bunker having a capacity of 8 tons. It is proposed to instal a conveyor throughout the length of the coal-store, which will deposit the coal at any point desired.

In 1920 the Company purchased some property in a prominent position in the High Street. A small but attractive showroom was opened, and has proved of great advantage and convenience to the consumers, who are enabled to see the most up-to-date methods of using gas for lighting, cooking, and heating. At a later date it is proposed to adapt the whole of the premises as town offices and demonstration rooms.

LUNCHEON.

After a pause for the taking of a photographic group, a move was made to the Swan Hotel, in the High Street, where a party of between seventy and eighty members and friends sat down to luncheon, as the guests of the Chairman and Directors of the Leighton Buzzard Gas Company, with Mr. Richmond in the chair. The Loyal Toast having been honoured,

Mr. RICHMOND said it was a very great pleasure indeed to him to welcome the Association to Leighton; and he was proud to say that this was the third occasion on which he had had to do so. Perhaps there were not many gas company chairmen who had been so privileged. The first meeting of the Association in Leighton, he thought, was in 1905; and then when Mr. Ruggles's father was President, in 1908. He regretted that on the present occasion one or two old personal friends were not with them, among them Mr. J. T. Joliffe and Mr. John Carter. But, on the other hand, he was very pleased indeed to see present three very old friends—Mr. H. Wimhurst, Mr. R. G. Shadbolt, and Mr. J. Davis. He hoped the Association would come again to Leighton Buzzard on some future occasion.

Mr. H. WIMHURST (Sleaford) said he had been asked to propose a hearty vote of thanks to the Chairman and Directors of the Leighton Buzzard Gas Company for the magnificent reception they had given the Association, and to Mr. Ruggles also for his warm welcome. From small beginnings, the Association had gone on and prospered, until now the members numbered 140. This was the 68th half-yearly meeting of the Association; and he thought he could claim to have attended 66 of them. He had done everything he could to support the Association, and hoped members following would do likewise. They missed their President's father, who was a man to whom one naturally became greatly attached.

Mr. RICHMOND acknowledged the vote, and remarked upon the good attendance of members, which he took as a compliment to the Gas Company. It was a matter of regret that one of the Directors, Mr. T. Bromhead Bassett, was unable to be present. He was pleased that Mr. Wimhurst had referred to Mr. Ruggles's father. It was certainly a great loss to the Company, and to the Association, when he died.

Mr. RUGGLES thanked the Chairman for presiding.

THE BUSINESS MEETING.

Subsequently the business meeting was held at the Corn Exchange—under the presidency of Mr. H. G. RUGGLES.

MINUTES OF LAST MEETING.

The minutes of the last meeting were taken as read, and confirmed; and the receipt was announced of various letters of regret at non-attendance from members and others connected with the industry—including Mr. Thomas Glover, of Norwich, and Mr. Thomas Hardie, the President of the Institution.

NEW MEMBERS.

Proposed by Mr. J. DAVIS (Gravesend), and seconded by Mr. C. G. GRIMWOOD (Sudbury), the following new members were elected: Mr. Ernest Hutchinson (Worksop), Mr. W. Mason (Oakham). and Mr. J. F. Simpson (Scunthorpe).

REPORT AND BALANCE-SHEET.

Mr. P. D. WALMSLEY (Great Yarmouth) proposed the adoption of the Committee's report and the balance-sheet.

"REPORTS OF DISTRICT GAS ASSOCIATIONS."

Mr. DAVIS inquired whether anything had yet been done with regard to discovering ways and means for resuming the publication of the "Reports of District Gas Associations." He thought something had been said about making a charge to the members for copies of these "Transactions." What was the result of the deliberations of the Committee appointed to go into the matter?

The PRESIDENT said the Committee appointed saw the Editor of the "GAS JOURNAL;" and he believed he was right in stating that his opinion was that the cost would be heavy. This was the sole reason for the publication's being discontinued.

The HON. SECRETARY (Mr. W. H. Mainwaring) pointed out that the question was raised at the autumn meeting of the Association. He asked for the names of any members who would be prepared to subscribe for a copy of the "District Association Reports;" and he did not get a single answer or a single letter with reference to the matter. The publishers naturally wanted some guarantee before incurring the expense of resuming publication.

Mr. DAVIS said he attended the autumn meeting; but he missed the Secretary's remarks on that occasion. He was satisfied with the explanation, but was sorry the matter had fallen through. The members, he thought, would have been only too pleased to subscribe to the re-publication of what was a very valuable book.

The HON. SECRETARY said he would still be glad to take the names of any members who would be prepared to do so.

Mr. DAVIS said now that the matter had been clearly put before the members, he hoped they would take it up.

Mr. RUGGLES then delivered the following

PRESIDENTIAL ADDRESS.

My first duty and pleasure is to thank you for the honour you have conferred upon me by my election as President of this Association. On looking back upon the list of Past-Presidents who have so eminently filled this position, I appreciate the great responsibility I have incurred in accepting the office, as well as the confidence you have placed in me; and I hope, with the assistance and support of the Committee and members, to be able to discharge the duties to your satisfaction.

Perhaps some of the members present will remember it was in 1908 that the Association last visited Leighton Buzzard; and I give below a table showing the growth of the Company since that time. It will be noticed that the population of the district has remained practically stationary; and from this point of view the figures are interesting. It should be mentioned that in 1915 we extended our mains to an outlying district, and secured 290 additional consumers.

Table showing the growth of Gas Consumption, &c., in Leighton Buzzard from 1908 *to* 1922.

Year.	Coal and Equiv. Carb. Tons.	Gas Made. C.Ft.	Gas Sold. C.Ft.	Gas Made per Ton of Coal Carbonized.	No. of Consumers.		No. of Stoves on Hire.	Population.
					Ordinary.	P.P.		
1908	4898	53,406,000	50,080,000	10,900	666	1104	1130	10,374
1921	6823	86,656,000	81,556,000	12,700	933	1791	1761	10,407
Incr.	1929	33,250,000	31,476,000	1,800	267	687	631	33

Gas sold, increase	61 p.ct.
Consumers increased—ordinary and prepayment	64 p.ct.
Number of stoves increased	64 p.ct.
Population increased only	0·3 p.ct.

The rapid development of invention and research in the gas industry during recent years is almost bewildering, and especially is this the case in carbonizing methods. The engineer or manager who has at the present time to undertake the construction or reconstruction of carbonizing plant is faced by the most embarrassing problem; and it is a matter of increasing difficulty and responsibility for him to advise his directors or committee upon the most efficient and satisfactory all-round plant to adopt. Up to a year or two ago the very remarkable results obtained from continuous vertical retorts with steaming seemed to point to that system as being far and away the best for cheap production of gas of a quality suitable for the majority of gas undertakings to supply; but of late the Technical Press has frequently chronicled most startling figures in connection with production of gas by complete gasification plants. If the volume of the gas produced was the only consideration involved, the decision would not be so difficult; but the questions of thermal value desired and percentage of inerts admissible alter the whole matter. The calorific value of the gas which is to be supplied must always decide the system, or combination of systems, by which that gas is to be manufactured.

CARBURETTED WATER-GAS PLANT.

To meet the increasing demand for gas in our district, it was necessary a short time back to enlarge the gas-making plant by additional carbonizing plant or some other means; and it was decided that the better policy was to instal a carburetted water-gas plant rather than face the heavy capital outlay involved in extending our retort-house. Although we could probably have attained our object by means of blue water gas alone, it was considered that, to obtain a greater flexibility, a carburetted water-gas plant would suit us better; and a Dellwik plant, by Messrs. R. & J. Dempster, Ltd., was installed early in 1920. We have found our selection to be justified, for not only have we been able to meet the demands for gas, but we have the advantage of being in a position to maintain a fairly constant calorific value, and to meet almost at a moment's notice any sudden demand for an increased quantity of gas.

The plant is operated from the ground level, and installed directly against the retort-house; the coke being delivered at the generator without any increased labour. By this arrangement, one man alone each shift is employed to carry out the whole of the operations at the plant, including the charging of the generator and the attention to the engine, blower, and pumps. Had the boiler for raising steam for the plant been a separate one, it would have been possible for him to have attended to that also. The only time it is necessary for the operator to go on to the stage is once about every half-hour, when a charge of coke is raised by means of a steam hoist on to the stage and delivered into the generator. The arrangement adopted for interlocking the valves renders the plant absolutely fool-proof.

The blower is of the positive type, and driven by a totally enclosed steam-engine; the gearing being of the laminated type running in oil baths, resulting in absence of noise. One feature in connection with this blower and engine is that it is only running at its maximum speed during the blowing period. During the run, the engine is revolving at such a speed as just to turn it over its centres; and by this means we get a considerable saving in wear and tear and in steam consumption. This will be a point of interest to those who have a water-gas plant the blower of which is driven by a steam-turbine or other means, and which may be running continuously.

One disadvantage, common to all water-gas plants, is the trouble experienced with dust and fliers coming from the stack valve; and if the plant is adjacent to a roadway with residential property alongside, it may be absolutely necessary to stop the nuisance. The firm who supplied our plant have recently put on the market a separate dust arrester, which can be fitted to existing plants; and it has been found totally to overcome the trouble. Both the blow and run gases pass through this. Water is contained in the arrester; the flow being automatically controlled by the air-blast mechanism. This intercepter serves as a primary washer; and the dust and fliers are drawn off once a day as sludge from the conical bottom of the intercepter, by means of a valve. On a recent visit to a works where this apparatus has been fixed, I saw that it was most efficient, and that no trouble was being experienced from back-pressure.

By paying strict attention to the times of operating the carburetted water-gas plant and to the control of the temperatures, we get a fairly high duty, averaging 40,000 c.ft. of 300 B.Th.U. gas per ton of coke when making "blue" gas—*i.e.*, 120 therms. The water gas enters the foul main at three points at a temperature of about 35° C.; and by this means we find it possible to admit up to 30 p.ct. of "blue" gas without making any appreciable difference to the calorific value of the mixed gas.

VERTICAL RETORTS IN COURSE OF ERECTION.

It has now become necessary to increase our coal gas making plant; and after careful consideration we decided to instal a small vertical unit, known as the "Adaptable," which is in course of erection. This plant has very recently been introduced by Messrs. E. J. & J. Pearson, of Stourbridge. It was hoped that the plant would have been in operation by the date of this meeting; but unavoidable delays have occurred which have hindered the progress of the work. I propose to give a short description of the plant, and enumerate a few of the special points claimed by the makers as to its simplicity of construction and, as its name implies, adaptability to manufacture either straight coal gas or water gas. With slight alteration it can be converted into a total carbonization plant.

The unit consists of two vertical retorts, 30 in. by 10 in. inside at the top, with radiated corners, increasing to 33 in. by 13 in. at the bottom. The height of the retort is 12 ft., not including the charging and discharging ends. The retorts are surrounded by heating chambers which are controlled by separate secondary air supplies, so that the temperature at any point may be adjusted as desired. The arrangement of the heating chambers makes it possible to utilize practically the whole extent of the retorts as carbonizing area. Consequently, by maintaining a high temperature throughout, the process of steaming may be carried to the highest possible limit. This is a most important point. The whole unit is enclosed in a steel casing lined with firebrick. At the base is built the generator or producer, in which water gas may be generated and passed up through heating chambers to supply external heat to the retorts. Provision is made for the process of steaming in accordance with the usual practice in connection with vertical retorts. If it is desired to use the plant for complete gasification, the steam and air would be admitted under the firebars.

The coal is carried to an overhead bunker, of a capacity of about eight tons, by a mechanically driven elevator; the feed to the retorts being regulated by the coal-valve connected to an auxiliary chamber, which is designed to contain sufficient coal for about three hours. This auxiliary chamber ensures a regular feed to the retorts, without the necessity of frequent operations of the coal-valve. The plant is designed to carbonize a minimum of 4 tons of coal per twenty-four hours. The makers claim a production per ton of coal when making coal gas, supplemented by steaming, of 18,000 c.ft. of 450 B.Th.U., which is equivalent to 80 therms per ton. The plant can be adapted to the process of total carbonization, with a production of gas per ton of coal of 50,000 c.ft. of 400 B.Th.U.—*i.e.*, 200 therms per ton. These must be admitted to be very excellent attainments, when it is pointed out that the capital outlay required compares very favourably with the cost of a horizontal plant of similar capacity. Only one man per shift will be required to work the plant; and it is estimated that the cost of repairs and renewals is at least 30 p.ct. cheaper than for horizontals.

The plant is situated in part of our coal-store; and to obtain the necessary height a portion of the existing roof was removed and the walls raised. In connection with the plant it is proposed to instal a conveyor throughout the length of the coal-store, which will deposit at any desired point coal whether required for this plant or for the ordinary settings.

DECLARED CALORIFIC VALUE.

The declared calorific value of the gas to be distributed by an undertaking must of necessity be determined by the gas-making systems in use; also the size and condition of the mains and services have an important bearing on the matter. At Leighton Buzzard, we have at the present time manual-machine charged horizontals and a carburetted water-gas plant. By experience we find our best and most economical results are obtained by mixing 80 p.ct. of coal gas, having an average calorific value of 530 B.Th.U., with 20 p.ct. of blue water gas of about

300 B.Th.U., giving an average calorific value of 484 B.Th.U. On this basis we have declared a calorific standard of 480. It may be considered that our margin is a small one; but the above-mentioned proportions allow a certain amount of flexibility in both the coal-gas and water-gas plants. Any falling-off in calorific value due to inferior coals, breakdown, &c., can be made-up by bringing the carburetter into use.

In declaring the calorific value of the gas to be supplied, current considerations, and not prospective ones, had to be taken into account. Another point which weighed with us in declaring a quality identical with that which we were supplying immediately preceding the granting of our Order was that by so doing we avoided the double complication, from the consumers' point of view, of a change in the basis of charge, as well as a change in the calorific value of the gas, and were able to give a direct comparison of the price per therm with the price per 1000 c.ft.; thus minimizing the suspicion with which the change was viewed by some consumers, who do not realize that the change from sale by volume to sale on the heat-unit basis is the greatest protection that the public has ever had in connection with gas supply—I venture to say that there is no commodity purchased by the public as to which their interests are so effectively protected as gas. To assist our consumers to understand why the alteration in the basis of charge was made, we distributed leaflets showing the object of the change, and giving a clear illustration of how to check the number of therms charged for.

COMPRESSING PLANT.

To overcome the difficulty of inadequate district pressure, we have recently installed a compressing plant and laid a high-pressure main to the centre of our district. The compressor is of the quadruplex type, and was supplied by Messrs. Reavell, of Ipswich. It has four compressing cylinders, arranged in the form of a Maltese cross; the pistons being driven from a common crank pin. Gas is drawn in and discharged from each cylinder in turn during each revolution. Consequently there is a very steady flow and discharge—in fact, it is quite feasible to fix a meter on the suction side to measure the quantity of gas passing. The compressor is driven by a vertical steam-engine, direct coupled, and is capable of compressing 12,000 c.ft. of gas per hour to 100 lbs. pressure. Arrangement is made by which the engine is automatically slowed-down and speeded-up according to the demand, so that a constant predetermined pressure is maintained.

Gas is supplied to the compressor through a 6-in. pipe, which is fed from the gasholder outlet (12 in. diameter). From there it passes through a 4-in. pipe into a receiver 18 ft. long by 6 ft. in diameter, made from a disused boiler shell. The pressure of the gas is raised from 6 in. to 20 lbs., and discharged into two mains through suitable governors, which reduce the pressure to 5 lbs. and 2 lbs. respectively; a set of gauges recording the pressures at the receiver and governor outlets. A 4-in. high-pressure main carries the gas for a distance of just over a mile, and feeds into a set of duplicate district governors. From the outlet of these, branches are taken and connected into three low-pressure mains. The governors are set to maintain a constant outlet pressure of 4 inches.

The pipes used were of steel, and have plain ends. The joints were made by butting the ends together, and were oxy-acetylene welded. They were tested up to 110 lbs. pressure. The pipes and governors were supplied and fixed by Gas Distribution, Ltd., of Nuneaton. A 5-in. diameter main was also connected to the receiver, and delivers gas at 2 lbs. pressure into an existing main near the gas-works which supplies a district three miles away. This main was laid some years ago for low pressure, and is therefore not at present suitable for use as a high-pressure main. It is proposed to relay this at an early date.

VARIABLE QUALITY OF COAL.

The Gas Regulation Act penalizes undertakings for supplying gas of a lower quality than the declared value; but if a supply of good and uniform quality of coal is not assured, how can they be expected to maintain their standard? As a protection against unjust penalties being levied for a deficient quality, it may be found necessary to make frequent tests of the calorific value of the coal delivered as well as of the gas supplied; and only by this means will it be possible to prove conclusively to the "powers that be" that any deficiency which may occur is due to circumstances entirely beyond the control of those who are responsible for the manufacture of the gas supplied.

It is now most essential that our principal raw material should be purchased on a qualitative basis, instead of by the existing vague and unsatisfactory method, which conveys only the name of the colliery or district whence the supplies are drawn. We know from experience what wide variations exist in the quality and characteristics of coals from the same seam; and though the price is ruled to a great extent by the district from which the coal comes, yet it is often experienced that supplies from a first-class colliery are received which, from a gas-making point of view, are very inferior to consignments from a second-class district.

It has been suggested that the collieries themselves should classify and grade coals from the various seams; but it is hardly to be expected that, so long as they can continue to sell shale and dirt at the same price as coal, any steps will be taken by them to amend the present state of things. It therefore appears that, if any improvement in this respect is to be made, the initiative will have to be taken by the purchasers; and we are, unfortunately not able to follow the example of the South Metropolitan Gas Company of establishing a testing laboratory near the collieries. A step in the right direction would be to insist on a clause being inserted in coal contracts whereby an allowance shall be granted by the colliery off the contract price for excess amounts of ash and moisture.

The selection of the most suitable coals for gas-making purposes is of the greatest importance to us all; and I submit that the need for up-to-date tables of reference, containing statistics setting out, among other important information, the thermal value, composition, ash content, and suitability or otherwise of the coals for carbonizing in either verticals or horizontals, would be of inestimable value to the industry. The collection of this information would, of course, take time; but the fund of useful particulars obtained would more than compensate for the cost expended thereon. At the present time each undertaking must find out for itself the suitability or otherwise of the various classes of coal offered to it; whereas, if a reliable book of reference, giving the analysis of the gas-making coals in the kingdom were available, we should then know something of the fuels which we are asked to purchase. One recalls that in earlier days, both in "King's Treatise" and "Newbigging," such tables were compiled by the late Mr. Paterson and others; but of recent years nothing systematic has been done in this direction.

CONSUMERS' METERS.

During the past year or two, the number of consumers' meters on our district which have had to be changed on account of faulty registration has considerably increased; and I have made very careful investigations as to the condition of the interior of a number of them which have been sent away for repairs. In more than 70 p.ct. of the cases, the defect was due to leaky diaphragms caused by the leathers having become dry and porous. This, perhaps, is not to be wondered at when we consider the changed composition of the gas which we have been forced to supply during the past few years. Up to recent times, gas carried its own lubricant and solvents; and prior to the practice of extracting such constituents as benzole and toluole, the deleterious deposits which are now found in meters, mains, and fittings were to a large extent carried through in solution and consumed. There are, however, several causes which are responsible for the increased percentage of faulty meters; overworking being most probably a frequent cause of failure. A meter, which was of ample capacity when fixed a number of years back, may to-day be required to deal with a volume of gas much in excess of its normal capacity. Especially is this the case when cooking and illumination loads coincide; and when a consumer decides to have additional gas appliances fixed, due regard should be paid to the capacity of the meter in use, as it is only to be expected that when worked to excess a meter will wear-out sooner, and repairs will be required more frequently.

It is not a difficult matter to keep a record of additional gas consuming appliances which are installed by the undertaking; but it sometimes happens that a local plumber or gasfitter is called upon to supply and fix gas-fires, geysers, &c., and it is only when a complaint of unsatisfactory service is received from the consumer that the cause of the trouble is located. To overcome this difficulty, it should be insisted upon that particulars of every additional apparatus so fixed must be immediately notified to the gas undertaking.

The change in the composition of the present-day gas points to the fact that the tin-cased dry meter, which has fulfilled its duty more or less satisfactorily for upwards of half-a-century, is now no longer able to withstand the more exacting demands required of it; and in the near future our meter manufacturers will perhaps evolve a strongly made and accurate measuring instrument constructed of easily replaced standard parts which can be fitted *in situ*, and thus avoid the excessively high costs occasioned by having to stock a large number of meters for use in place of those away for repairs. It will be admitted that it would be a distinct advantage that any new type of consumer's meter introduced should register the number of therms passed.

Under existing statutory conditions, a gas-meter must of necessity be a sealed instrument—thus precluding any cleaning or adjustment of the mechanism; and the fact that it has to work over long periods without attention imposes very severe conditions. Again, it is often fixed in some out-of-the-way place, such as a coal cellar, where it is subjected to the influence of damp and extremes of temperature. When these circumstances are considered, the question arises whether it is not a paying proposition to have all meters periodically overhauled—say, after ten years' work—as some undertakings have made a practice of doing. The cost entailed, especially at to-day's high prices, would be a serious item in our revenue accounts; but the reduction in the figure for unaccounted-for gas would be a set-off against the expenditure. A meter may continue to work long after a defect has developed; but sufficient time may elapse between the development of the first defect and the final failure to render the service unremunerative, owing to all the gas passed not being registered.

There is another matter worth attention—to encourage the consumer regularly to check the gas consumption for himself. This is especially necessary now he is asked to pay for therms instead of cubic feet. Although much has been done in the way of issuing instructions on how to read meters, it is surprising what a large number of intelligent consumers there are who are entirely

ignorant of the procedure. The public seem to harbour a sinister suspicion regarding gas undertakings and their meters; and if they were educated to read their own meters and control their own gas consumption, a great deal of this suspicion would, I feel sure, disappear.

PREPAYMENT CONSUMERS.

It has been the policy of this Company to cultivate the use of the slot meter as much as possible by including in each installation a good-class cooker and two lighting points free of cost. Although the capital outlay involved has been high, yet the cost has been justified by the fact that the consumers are provided with a handy and economical means of cooking and lighting, of which they take full advantage, as is evidenced by the fact that the average consumption of each slot-meter consumer is nearly 20,000 c.ft. per annum; and although the population of the district has remained practically stationary during the past ten years, the number of slot meters in use has increased by 35 p.ct. during that time—and this without any reduction in the number of ordinary meters fixed.

The system of collection and keeping the accounts is simplified by the use of the card system; the meters being cleared every six weeks. The cash, after being brought to the office twice each day, is totalled and balanced with the amount of cash received as entered on the cards. At the end of each collection the quantity of gas consumed and the cash collected are entered in the slot rental book, and the totals brought forward in the general rental each quarter.

In common with other undertakings, the cost of altering the wheels as the price of gas was advanced was felt to be a very serious burden; and when the price has been reduced we have not altered the meters, but returned to the consumer each quarter the difference between the cash required and the total of the amount of cash in the box. This system has worked smoothly, and has the advantage of providing a ready means of recovering shortages, also small payments for fittings, residuals, &c.

RESIDUALS.

Coke.—The market value of coke has fallen considerably in the past six months; the decrease in a large number of districts being much greater per ton than the reduction which has been made in the price of coal. Last year, owing to the coal strike, coke was brought into greater use than ever before; and the public had an opportunity of finding out the advantages of employing a smokeless fuel and the method of obtaining the best results from its use. It is up to us to do all we possibly can to increase our local coke trade, by providing the grade of fuel best suited to the requirements of our particular locality. Certainly, some of the additional business secured during the strike should be maintained, to the advantage both of the users and ourselves.

Tar.—The outlook for tar during the present year does not appear particularly bright. Although we may expect a large demand for dehydrated tar for use on roads, yet the prices realized will apparently be considerably below those ruling last year. I should like to mention the great assistance which the Commercial Section of this Association has rendered to its members by the issue of monthly certificates of the market value of this residual. By this means, the fall in price has undoubtedly been steadied.

Sulphate of Ammonia.—The profit to be derived from the manufacture of sulphate of ammonia is at the present time almost a negligible quantity, and will, I fear, remain so until the price of sulphuric acid is reduced to a reasonable figure. The increasing demand for neutral and dry sulphate containing a high nitrogen content will necessitate additional expenditure on those plants not adapted for the manufacture of a product which will meet these demands; and under the present high cost of materials it is, to those having old-type plants in use, a matter for serious consideration whether sufficient profit can be made under existing conditions to warrant the extra outlay.

NAPHTHALENE.

We have been considerably troubled at intervals with naphthalene stoppages, both on the works and the district. During last summer these became so acute (totalling 844 blocked services during the month of June) as to demand special measures being taken to deal with them. We have tried at different times, and with varying success, most of the modern remedies; but my experience is that a method of treatment which will prove effective at one time with certain conditions may be quite ineffectual at other times and under different conditions. During 1917-1918, when we were washing for the recovery of benzole and toluole, we were constantly having some part of the works mains partially choked. A blockage occurred in the inlet to one of our gasholders, and resulted in a very serious explosion and fire, as the back-pressure created blew the water seal of the station meter, allowing a quantity of gas to escape. The station meter, meter-house, and a portion of our offices were completely destroyed.

After this serious mishap, steps were immediately taken to extract the naphthalene which had been absorbed by the wash oil by the use of a supplementary condenser and evaporating tray placed between the still and the main condenser. The process proved very satisfactory, and was continued until we dismantled our benzole-recovery plant. We are now using "Solvit" in one chamber of our washer, at the rate of about 10 gallons per million cubic feet passed, and for the past six months have had no blockages whatever on the works.

For dealing with naphthalene deposits on the district, we use a Parkinson vaporizer, with ordinary paraffin oil as a solvent. This is fixed immediately on the outlet of the station governor. The apparatus was fixed in June last year, when the number of naphthalene stoppages averaged about thirty each day. The oil was vaporized at the rate of 10 gallons per million cubic feet of gas passed. By August, the complaints had dropped to an average of six each day, and the consumption of oil was reduced to 5 gallons per million. Since December, we have had an average of only two stoppages each day, and have used the vaporizer only intermittently.

DISTRIBUTION DEPARTMENT RECORDS FOR SMALL WORKS.

One of the essentials to the management of a distribution department is a handy and compact system (not entailing a lot of office work) whereby the executive has all the information relating to the district available at a moment's notice. As a result of the previously mentioned fire at the works in 1918, all our records were destroyed; so that a favourable (?) opportunity was created for the inception of some really efficient method of keeping these records. Doubtless most of you know, from past experience, the great waste of time and money which occurs in so many cases, such as: A leak reported in a road—no one knows where to find the main; blockage in main, perhaps a syphon buried—no record; and choked or corroded service pipes—laid perhaps thirty years ago, and which may make two or three right-angle turns under the roadway.

Seeing that similar troubles are the common experience of many managers of small works, I considered it might be interesting, and perhaps helpful, if I described the card-index system we have inaugurated for dealing with the distribution side of our business. The system is indexed alphabetically under street and road names; and in a district of this size, or smaller, it is very simple and handy. Possibly in a much larger district it might be more convenient to index alphabetically in each of several districts. It is built-up of the following cards, all 5½ in. by 3¾ in., and it will be obvious that one has only to turn-up in the cabinet any road or street required in order to have all the information, from mains to consumers' meters and appliances, at hand.

Blue Cards—Mains.—These are supplementary to a record of mains drawn on a large ordnance map. As you know, it is impossible to get any details of connections, &c., on such a map. We therefore have one or more blue cards, as required, for each street, with all particulars, and where necessary, as is generally the case, dimensioned sketches. When starting to collect information afresh, as in our case, every time a main is bared for any purpose whatsoever, the fitter responsible has to bring in all details as to depth, precise locality, &c., immediately upon completion of the job. This information is entered on the cards; and in this way a complete record will ultimately accumulate.

Pink Cards for Services.—A separate card is made out for every service, when put in or opened up for any purpose; the fitter responsible bringing in all particulars as in the case of the main cards. Where necessary, a sketch is given on the card.

Red Cards for Governors and Valves.—These—one for each governor or valve on the district (excluding, of course, ordinary service main cocks)—are very necessary, as it is essential to know not only the precise locality of any such, but to be able to turn-up at a moment's notice particulars as to size, &c., or when last overhauled; periodical attention being absolutely necessary for all.

Salmon Cards for Public Lamps.—In these days of curtailed public lighting it is not always a simple matter to find out, in the office, whether a certain lamp is in use this season, or was last. These cards (provided, of course, that each lamp is numbered to agree with its corresponding card) will answer these and similar questions, and will also show at a glance just how much any individual lamp costs in a season for mantles, repairs, &c. In this way attention is drawn to any lamp which is extra heavy on maintenance, and the matter can then be remedied. It is, of course, necessary that those responsible for keeping the lamps in order should note the numbers of the lamps on which all materials are used.

White Cards for Syphons.—We have had a great deal of trouble owing to missing records and lost main syphons. These cards are, we believe, now complete enough to obviate any difficulty in future; and in connection with the main syphon cards (which you will note are numbered), we have a syphon book, in which every syphon is sketched and correspondingly numbered, which the man takes out with him when he pumps the syphons. From his entries the cards are kept posted up. We can therefore tell at a glance if any syphon has missed its periodical pumping, or if more tar or water has accumulated than usual.

The service syphon cards are similar, and are distinguished readily from the main cards by the blue cross. These have no numbers, and no corresponding book, as there are few syphons on services which it is necessary to pump periodically.

Yellow Cards for Maintenance.—One of these is made out for each different premises included in our maintenance scheme; and by them can be seen if and when a maintenance fitter's call is due at any premises, and if any are heavier than normal on calls. These are, of course, used in connection with maintenance counterfoil books, which the occupier signs at every call.

Green Cards for Customers' Appliances.—These have been designed to complete in the one cabinet our record of the distribution side of our business. You will see they deal (one card for each customer or premises) with the whole of the Company's property on the premises, and in the case of meters only, with consumers' own, where they have to be read by our inspector. The

BLUE CARD—*Mains.*

CHURCH STREET, LINSLADE.

6 in. cast-iron main.
Laid by in February, 1900.
Under gutter on left hand side of road from Church Street to New Road; 4 ft. out from edge of kerb, with 2 ft. 3 in. cover.

On the back of the card appears a sketch plan of the main.

PINK CARD—*Services.*

ADDRESS: ASHWELL STREET, No. 38.

Old service supplying 3 houses inadequate.
New ¾ in. service put in for 1 house only, by Smith, 7/6/21.

On the back of the card appears a sketch plan of service.

RED CARD—*Governors and Valves.*

[FRONT.]

WING ROAD. WING RD. LEVEL CROSSING.

Governor—6 in. Donkin, from 6 in. steel to 3 in. cast main.
Set at 4 in. outlet pressure.
Put in 7/6/01 by Jones and Co.

[BACK.]

Date.	Fitter.	Remarks.
7/6/21	BX.	New Leather.
8/7/21	BX.	Inspected O.K.

SALMON CARD—*Public Lamps.*

[FRONT.]

ALBANY ROAD. Lamp No. 31.

On left-hand side of road from Hastwell Grove, opposite No 77.
Erected 6/7/01 by J. C. B.
"C" Lantern and Bulb set.

[BACK.]

Season.	In Use.	Material Used. Mantles.	Material Used.
1900–01	No	—	—
1901–02	No	—	Column painted.
1902–03	Yes	6 "C"	2 rods, 1 glass, 1 chimney.

WHITE CARD—*Main Syphons.*

[FRONT.]

Syphon Number 11
Locality KING STREET.
29 ft. from edge of kerb in Plantation Road, 4 ft. from wall. Outside side door of valve-house.
1 quart pot and surface box, on 6 in. main, put in 6/7/21 by J. C.
Sketch.

[BACK.]

Date.	Initial.	Remarks.
21/6/20	J. C.	Clear
21/6/21	"	"
7/12/21	"	½ gal. water

WHITE CARD—*Service Syphons.*

[FRONT.]

Syphon Number.
ADDRESS. Hockliffe Road, No. 66.
Dead end of 1-in. pipe on service in passage, put in 6/7/21 by XY.
Sketch.

[BACK.]

Date.	Initial.	Remarks.
6/7/66	J.X.	Clear.

YELLOW CARD—*Maintenance.*

FRONT.—Similar ruling is continued on the back.

High Street. St. Andrew's Church.

Date Started:—6/7/21.

Fitter.	Date.	Fitter.	Date.	Fitter.	Date.	Fitter.	Date.
AB	6/5/20	BC	7/6/20	CD	12/7/20		

GREEN CARD—*Customers' Appliances.*

FRONT.

Address.	Bridge Street, Leighton.
Customer.	Messrs. Brown and Sons, Ltd.
Meter.	Ordinary.
Deposit or Reference.	£2. Paid, 6/12/02.

BACK.

Meter.	Cooker.	Fire.	Fittings.
10-Lt. Ord. 6757600/09 Cavan repd. 1919. Fixed 6/7/19 by J. C.	D90. Hire. J. C. 7/6/20.	"Minerva" Hire. J. C. 7/6/20.	Private property.
10-Lt. Ord. 652106 P. and C. new /20. Fixed 7/6/20 by C. K.			

cards are not, of course, intended to apply to consumers' private stoves or gas fittings. Dealing, as these do, with meter, cooking, heating, and lighting appliances, they eliminate such cumbersome work as the keeping of meter, stove hire, and hire fitting ledgers, and have the further advantages of showing at one look how long meters or appliances have been fixed, or when the meter was last repaired, &c.; or if removed, when, by whom, and why.

Of course, when a card is filled up and there is no room for further entries (this cannot happen in the case of main and service cards), it is replaced in the cabinet by a fresh card, on to which all the essential information is carried forward; the filled cards being filed elsewhere for reference. This leaves only live cards in the cabinet—on the loose-leaf ledger principle.

STOCK CARDS.

We have also inaugurated a card-index system for stock keeping and stocktaking. It consists of three kinds of cards, one of each

BLUE CARD.

Date.	Quantity.	Order. No.	Order. Date.	From.	Remarks.	Folio.	Receipts of..... From.... To.....

WHITE CARD.

Date.	Quantity.	Issued to.	Job.	Remarks.	Folio.	Deliveries of ... From.... To.....

GREY CARD.

STOCK of _____ YEARS _____

—	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Stock												
Receipts												
Deliveries . . .												
Stock												

The bottom half is a repetition of above (as is also the reverse side).

being made out for every separate article stocked or used. All are filed together, alphabetically, such as:

Tins—Cooker, D 90, Drip . . . . Indexed under T.
Mantles, "C," Special Maintenance . ,, ,, M.
Brackets—Slot—"C"—S. Swing . . ,, ,, B., &c., &c.

The blue card has entered upon it all articles received into store, either from makers or returned by fitters.

On the white cards are entered all goods issued or delivered from stores.

You will see that for most articles, in a small works like Leighton Buzzard, these cards will last a considerable time before getting filled up.

At the close of each month, the blue and white cards are ruled across with a red ink line and totalled up—the totals being carried to the grey or stock cards. From these stock cards, not only can the stock of any article be seen at a glance at any time, but also what quantities are used and received during any period—say, a month or a year.

In bringing my address to a close, I feel I have not been able to put before you anything very new or of extraordinary interest. But I hope your time has not been spent unprofitably; and I thank you for the patience with which you have listened to me.

The President Thanked.

Mr. W. B. Farquhar (Ilford) proposed a hearty vote of thanks to the President. They must all, he said, agree that the address contained a large amount of very valuable information. They would be keenly interested to know how the new vertical retort installation turned out. He trusted it would be a success, because it was a plant which he was sure was badly needed in moderate-sized works.

Mr. H. R. Wimhurst (Bury St. Edmunds), seconding, said the address was full of interest. It dealt with all the problems which were besetting the engineers of small and moderate-sized works, and enabled them to realize the difficulties in running such works. Mr. Ruggles had that morning shown them a very up-to-date little works. His method of card-indexing was admirable.

The Carbonization of Coal in Gas-Generators.

Mr. Samuel Moore (London) then read a paper on "The Carbonization of Coal in Gas-Generators," which, together with a report of the discussion, will be found on pp. 262-65.

The Vice-President (Mr. T. F. Canning, of Southend) said he had great pleasure in proposing a very hearty vote of thanks to Mr. Moore for his very able and interesting paper. He had gone to a great amount of trouble and put a lot of time into it. They were all dealing in everyday practice with the question of carbonization; and they had to see that out of their coal-gas plants they got the maximum efficiency. They all knew the care and supervision that was required to do this. Also in the case of water-gas plants they had to have very careful supervision to secure the maximum efficiency. With a total gasification system, they had the two plants combined; and one of the problems those who were tackling this matter would have to solve would be to get the maximum efficiency out of each separate process in that plant. If Mr. Moore by this method of his was able to do that, he would have taken them a very great step forward. He claimed a great number of advantages for his plant; and it was their wish that he should meet with every success. They were particularly grateful to him for having come to the meeting at considerable inconvenience to himself, in view of the fact that he was indisposed.

Mr. E. F. Keable (Southtown) seconded the vote, which was cordially passed.

New Office Bearers.

The following office-bearers were then elected:

President.—Mr. T. F. Canning, Southend.

Vice-President.—Mr. E. F. Keable, Gorleston and Southtown.

Committee.—Mr. C. G. Grimwood, Mr. P. D. Walmsley, and Mr. J. R. Bradshaw (for one year in place of Mr. Keable).

Auditors.—Messrs. Mallett and Venner, re-elected.

Secretary and Treasurer.—Mr. W. H. Mainwaring, Lincoln, re-elected.

Mr. A. W. Sumner (Grays), in proposing Mr. Canning as President, said he was well known to most of them. It was unnecessary to say much about him now, because the members would have full opportunity of seeing how valuable a man he was. There was no doubt he would fill the position with credit to the Association.

Mr. Keable seconded, and said that, though he had only known Mr. Canning a short time, he had already learned to value his experience.

Mr. Canning, in acknowledging his election, assured the members that he would do everything possible to maintain the high standard of the Association.

Place of Next Meeting.

The President said the Committee's suggestion was that the next meeting, usually held in September, should be in London. It had been found to be the most suitable place for the autumn meeting.

This was agreed to.

A Vote of Thanks.

On the proposition of Mr. Shadbolt, seconded by Mr. Davis, a hearty vote of thanks was passed to the President, other officers, and the Committee. Mention was made of the excellent services rendered to the Association by Mr. Mainwaring, as Secretary and Treasurer.

Institution Benevolent Fund.

The President said the Committee recommended that a donation of five guineas be made to the Benevolent Fund of the Institution of Gas Engineers.

This was agreed to, on the proposition of Mr. Shadbolt, seconded by Mr. Davis.

Annual Dinner.

The members afterwards took tea; and in the evening the annual dinner was held at the Swan Hotel—a very enjoyable time being spent.

VISIT TO LUTON ON APRIL 27.

Messrs. Davis's Hospitality.

The excellence of the work carried out at the Luton Works of the Davis Gas Stove Co., Ltd., is manifest in every department of that factory; and the general impressions brought away are of effective organization and of the attention given to the comfort of the human machine. Control of the widely diverse departments of the works is admirably decentralized from the Chief through the Works Manager and Heads of Departments; while the existence of a Works Committee—not a sleeping partner—reassures the rank-and-file, and is one of many factors that make a "happy family" of the Luton establishment. Their comfort is surely as well served as by any management in the country; and it pays. The canteen accommodation consists of two large rooms (one just completed), adequate kitchen appoint-

ments, a billiard room, a refreshment bar, and roomy cloak-rooms and lavatories. Outside are two perfect *En tout cas* tennis courts and a bowling green whose turf might be envied at Wimbledon; while a sports ground not far distant offers ideal conditions for football, cricket, and hockey. The works possesses its own first-aid station with a surgery and separate rooms for men and women. A highly-trained "orderly" is always in attendance, whose efficient service is said to save many man-hours of work.

Over fifty members of the Eastern Counties Association assembled at the works before 11.30 last Thursday, the majority being conveyed by motor by the Davis Company from Leighton Buzzard, where the Spring Meeting took place the previous day. They were divided into parties, and commenced the tour of inspection and instruction under the guidance of Mr. Harold Davis (the Managing Director), Mr. Twigg (the Technical Manager), Mr. Blackwell (the Works Manager), and Messrs. Clift, Ure, and Donnelly (Heads of Departments). The main road through the works roughly divides the foundry part from the fitting and furnishing shops, while the lay-out is such as to secure a continuous movement of materials through the various processes from an "in" siding where foundry coke, pig-iron, sand, &c., arrive to an "out" siding where the finished goods are platform-loaded from the warehouse for dispatch.

The Pattern Shop and Core-Making.

Wood patterns are used but little in their work. All moulding for light castings is done with iron patterns obtained as follows. From an original in plaster is taken a matrix in lead and tin alloy, which can be worked almost like cheese; from this three or four iron "originals" are cast; and finally as many as thirty or forty working patterns are run from the latter. In the case of very small parts—such as burners—several impressions are arranged on one plate, which the moulder uses on each half of his box.

Core-making is a fine art and interesting at all times; but especially is this the case when so many very small castings are required. A core must be very strong, yet possess a continuous vent hole for the passage of gases evolved in the casting. It must have a fine surface, yet be porous and easily disintegrated. At the Diamond Foundry they are made of a mixture of sharp sand, clay, and treacle, and after being burnt have all these characteristics. Most of the light core-making is done by women; but it was astonishing to see the rapid and accurate work of a blind ex-soldier employed in the shop.

The Foundry.

The moulding sand is from Leighton Buzzard quarries. A definite quantity of fresh sand is regularly sent into the foundry, after being thoroughly mixed with the old and by a neat plant of centrifugal machines and elevators. Its suitability may be roughly gauged by squeezing a handful and noting its adhesiveness. A Roots blower functions with the cupola, which at present supplies 35 to 38 tons a day; though the capacity of the foundry full out is 70 tons. Messrs. Davis have adopted the principle of delivering the molten metal to the moulders, who run their work with hand ladles. For this service they have to pay a nominal sum.

The castings are dressed with wire brush, file, emery wheel, and rumbler, are then checked, and, if passed, noted in the moulder's book. The even texture and grey colour throughout of the smallest casting are noteworthy, and ensure reliability and easy working in subsequent processes.

Assembling and Testing.

Time allowed but a perfunctory glance into the machine shop and tool room; and the parties then passed through the foundry stock room, observed the grinding shop (where the surface finish is graded-up from a wet wheel to a fine polishing bob), and entered the stove blacking department. Here the castings are sprayed by compressed air and stoved at about 400° Fahr. They are then ready for assembling; and it was noticed that a screw-driver seemed the most important implement in this operation. The foreman tester then has his decisive verdict to make on cooker, fire, or geyser; and his meters and gauges are reckoned as proof positive of satisfaction or a "waster." The pressure for testing is 30·10ths, and an average calorific power is taken as 450 B.Th.U. Thence to the finished goods house and the siding, for showroom or stock.

Enamelling.

Mention must be made of this process, in which, as elsewhere, order reigns supreme. The component materials—borax, felspar, colours, &c.—are stored in bins until it is time for certain proportions of them to be melted and mixed in a furnace, whence the mass is run into water to prevent its conglomeration. Grinding-down with water completes the preparation of the enamel for spraying on to the casting. Drying-off in a hot room takes about two hours, when the parts are ready to be handled into the furnace by a "horse-and-fork." For success in enamelling—this does not occur readily to the lay mind—the ingredients of the enamel must have the same coefficient of expansion as the metal it will adorn.

A hasty visit only could be paid to the furnace demonstration room, where a Davis reversible regenerating forced-draught furnace was under fire. With a temperature of 1050° C., the flue gases register only 60° C. and the efficiency is 40·1 p.ct.

Geyser work and copper spinning, and sheet-iron cutting and stamping having been given attention, the parties had completed the practical side of a gas-stove factory; but the power behind it all remained.

Scientific Control.

There were seen an experimental shop, where models of new appliances and of improvements to old ones are turned out; a testing room, with a calorimeter kettle showing hard facts, and where Science is not allowed to be blind to everyday conditions of practice; chemical apparatus for the investigation of optimum composition of iron castings for different purposes, and photographic apparatus for examination of its texture. Not many years ago, manufacturers might have smiled at such work; but luckily it is now more and more realized how essential is research.

LUNCHEON.

After the tour of inspection the members collected in the canteen, and shortly afterwards sat down, sixty-five in all being present, to an excellent luncheon at the invitation of the Company. It was served in the large new dining room. Afterwards—

Mr. H. G. Ruggles (the President of the Association) rose to propose a hearty vote of thanks to Messrs. Davis for inviting them to make such an enjoyable and instructive visit. It was not the first time the Association had visited the Diamond Foundry, as they had been entertained there in 1908, and had received then the same cordial reception. They were certainly all struck by the wonderful organization of the works. They all strove to attain efficiency and economy; and Messrs. Davis & Co. had undoubtedly realized both—from start to finish. Much was due to the good feeling which existed between all ranks; and this was to be expected when they saw how splendidly the employees were catered for. The Company were a power not only in Luton but throughout the industry. In Leighton Buzzard 99 p.ct. of the gas-stoves were Davis. On behalf of the Association he thanked them most heartily.

Alderman R. Richmond, J.P. (Chairman of the Leighton Buzzard Gas Company), in seconding the vote of thanks, wished to supplement the President's remarks. It was most gratifying that such an excellent visit should have been added to the success of the Leighton Buzzard meeting. The Company's hospitality at the luncheon reminded him of old Ascot days. He thanked them cordially.

Mr. J. Davis (Gravesend) thought the vote had been admirably put and seconded. He now proposed the health and long success of the Company. After this toast had been honoured with enthusiasm by all present,

Mr. Cyril Davis rose amid applause, and said he did so on his brother's (Mr. Harold Davis, Managing Director) behalf. They much appreciated the kind remarks that had been made, and were glad to feel they were able to interest the members of the Association in gas-appliance manufacture. He thought they had been impressed, and was sorry time had not permitted them to see more—especially the showroom department. At meetings of the Eastern Counties Association he and his brother felt at home, for the members had visited the Diamond Foundry more than once, and their father was a member of the Association; and invitations to attend their meetings were always greatly appreciated. He and his brother had received their school knowledge and education from Eastern Counties' men. He wished to renew his thanks and to express great pleasure at the members' enjoyment.

Mr. Harold Davis, who also was received with acclamation, said he and his staff all felt at home on the works; but he was inclined to tremble at such an occasion as this, as the best was necessary. But his nervousness had disappeared during the tour of inspection. It was a red-letter day for their business—though not the first. It was an honour to have escorted the members round the works and to note the intelligent interest they had displayed. He was glad the visit had proved enjoyable and instructive. Mr. Ruggles had conveyed to them a vote of thanks; but there was another aspect—the works would not be there but for the competence of the engineers who supported them. If they had appeared to charge more for their productions than they ought, the members were begged to remember the brains put into the work; for brain work in the laboratory meant success, and a small margin of profit was surely allowable. They were proud of their works, and of the magnificent spirit which prevailed there; and he thought there would be far less industrial strife if the same existed everywhere. They had that day fulfilled the ambition of having a hall to provide for the comfort and entertainment of their boy and girl employees. It was a happy coincidence that the visit had synchronized with the completion of the hall, which had been opened thereby. It was indeed a proud and happy moment; and he regretted his father was not present to see the achievement. He closed with renewed thanks.

Davis Appliances.

A display of cookers, radiators, fires, and geysers had been arranged in the dining hall. Mr. Twigg admirably demonstrated a new front tap-rail cooker with Efficiency type hotplate. These are fitted with four different sizes of burner—a small one-head burner, equivalent to the ordinary simmering burner; a large single-head of similar capacity to the small ring-burner; a three-head Efficiency burner corresponding to the larger ring-burner; and a four-head having a capacity equal to that of the largest rings usually fitted to domestic cookers. In addition there is a double revolving griller. The above is for the full-size hotplate No. 140; while an intermediate No. 139 has no simmering burner, and a smaller No. 138 has only one single-head and the four-head burners—besides the two-burner griller. For the same amount of work done in boiling, it is claimed that this new hotplate consumes 50 to 70 p.ct. less gas than their pre-Efficiency cooker hotplate—in fact as much as 100 p.ct. under certain conditions. Mr. Twigg emphasized the importance of considering conditions of use in cooking. Purely technical considerations had

to stand down to practical utility. Their testing work covered both; and the duplication was amply repaid.

The new Hector geyser, with its development and advantages, was then explained by Mr. Snow. He showed the facility of lifting the whole barrel from the burner, and of removing the inner boiler—the most vulnerable part of a geyser—for attention. It was an ideal and efficient maintenance geyser for gas companies to instal.

The company then adjourned to the tennis courts for a photograph, which terminated a most successful visit.

THE CARBONIZATION OF COAL IN GAS-GENERATORS.

By Samuel Moore, of London

(late Engineer and Manager, Scunthorpe and Frodingham Urban District Council Gas-Works).

[A Paper read before the Eastern Counties Gas Managers' Association, April 26.]

This paper might properly be described as a continuation of the communication on "Water Gas and Coal Conservation" which I had the honour of reading at a meeting of the Association held in London on Oct. 22, 1920; and I trust you will consider the present contribution worthy of similar courteous and constructive criticism.

I feel the greater honour in being invited to address you upon the present occasion; and I think you will believe me when I say that I come before you to-day not for personal advantage or advertisement, but because I believe I have a message which may be of some benefit to my fellow members.

The subject-matter suggested to me as most likely to interest you is "The Carbonization of Coal in Gas-Generators," with special reference to the particular process with which my name is associated. It often happens that the utterances of men of science like the late Prof. Vivian B. Lewes, or the efforts of pioneers like Mr. Thomas Settle, lead other men of perhaps less ability to develop and improve upon the original proposals. Indeed, I doubt if any of us fully realize the debt of obligation we are under for the "auto-suggestions" and "brain waves" which come to us in our daily vocations from sources outside ourselves. Thus, in the evolution of the "Moore" system of gas manufacture I have been helped by a large circle of more or less unconscious co-partners, who in the office, the workshop, the lecture-room, the Technical Press, &c., have all contributed to the developments which I now propose to describe.

My paper to-day deals with general principles rather than with detailed analyses and working results. At the present moment, there is not a complete "Moore" generator plant actually in existence, though such plants are now under construction, and a number of installations expected to be at work within the next few months—at Scunthorpe and elsewhere.

What has already been done with the modified "Moore" plant at Scunthorpe is far short of the results anticipated when the complete plant is in operation. Therefore it will be wise, I think, to defer publication of detailed analyses, &c, until these can be obtained later, and preferably under the auspices of an impartial Committee of Investigation.

Meanwhile, I merely state the fact that during the nine months ended Dec. 31, 1921, the average output of town gas at Scunthorpe amounted to over 30,000 c.ft. per ton of coal carbonized; and the Gas Manager was frequently complimented, during that period, upon the greatly improved gaslighting of the town, compared with previous years. We were always too busy at Scunthorpe to make exhaustive tests; but when sending out up to 85 p.ct. of generator gas (and over 30,000 c.ft. of gas per ton of coal carbonized), we have never known the total B.Th.U. to be less than 419 (gross), or the carbon monoxide to exceed 24 p.ct. The Moore gas possesses the characteristic odour of coal gas; and the inerts therein have never exceeded 15 p.ct.

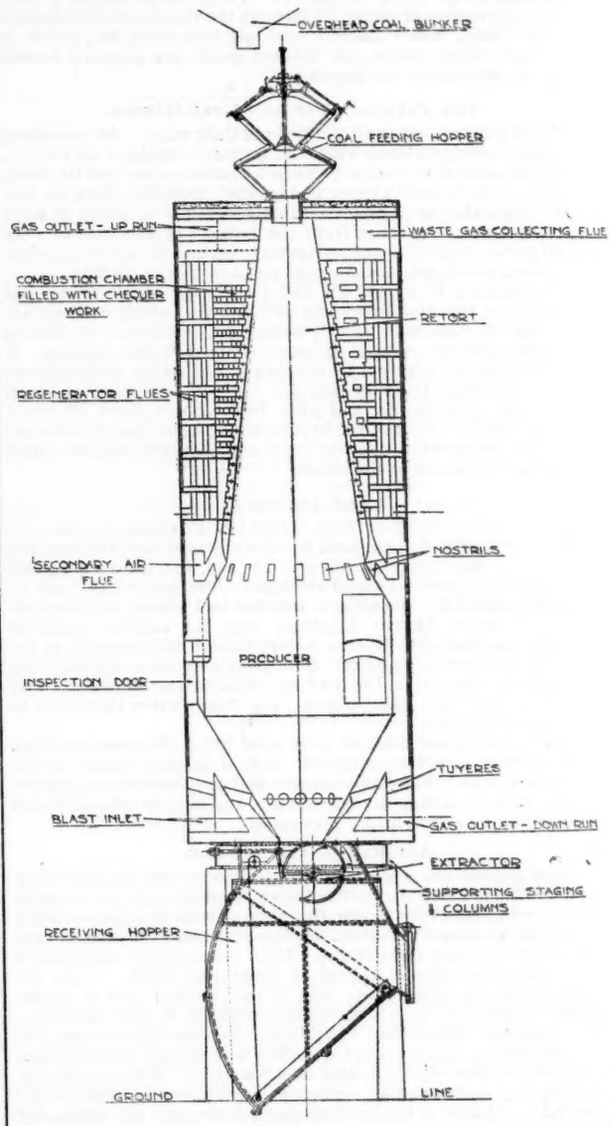
It is difficult to put the actual facts into words; but there is no doubt in my mind that further investigation will prove that the singular composition of Moore gas ensures higher thermal results than mere British thermal units content would suggest. Be that as it may, the fact remains that the incandescent gas lighting of Scunthorpe is brilliant, and superior to many towns where little more than one-third the quantity of gas is obtained per ton of coal used. The results, financially and otherwise, have been so satisfactory to the district that the Scunthorpe and Frodingham Urban District Council are installing the complete Moore system at the new gas-works in course of erection; and it is intended to supply the town from this new plant exclusively.

With an output of 30,000 c.ft. of gas per ton of coal, the quantities of coke and tar available for sale averaged 6 cwt. and 8 gallons respectively; but these results are poor compared with what we expect to obtain from the new plant. As might be expected, the proportion of ammonia recoverable is very high; but we have not kept a record of the actual figures, as we had no sale for our gas liquor during the period under review. The quality of the coke can be varied from half-distilled "Coalite" to any class of less volatile coke as desired, according to the speed of extraction. The tar is excellent, and similar to dehydrated tar.

Main Features of the Moore System.

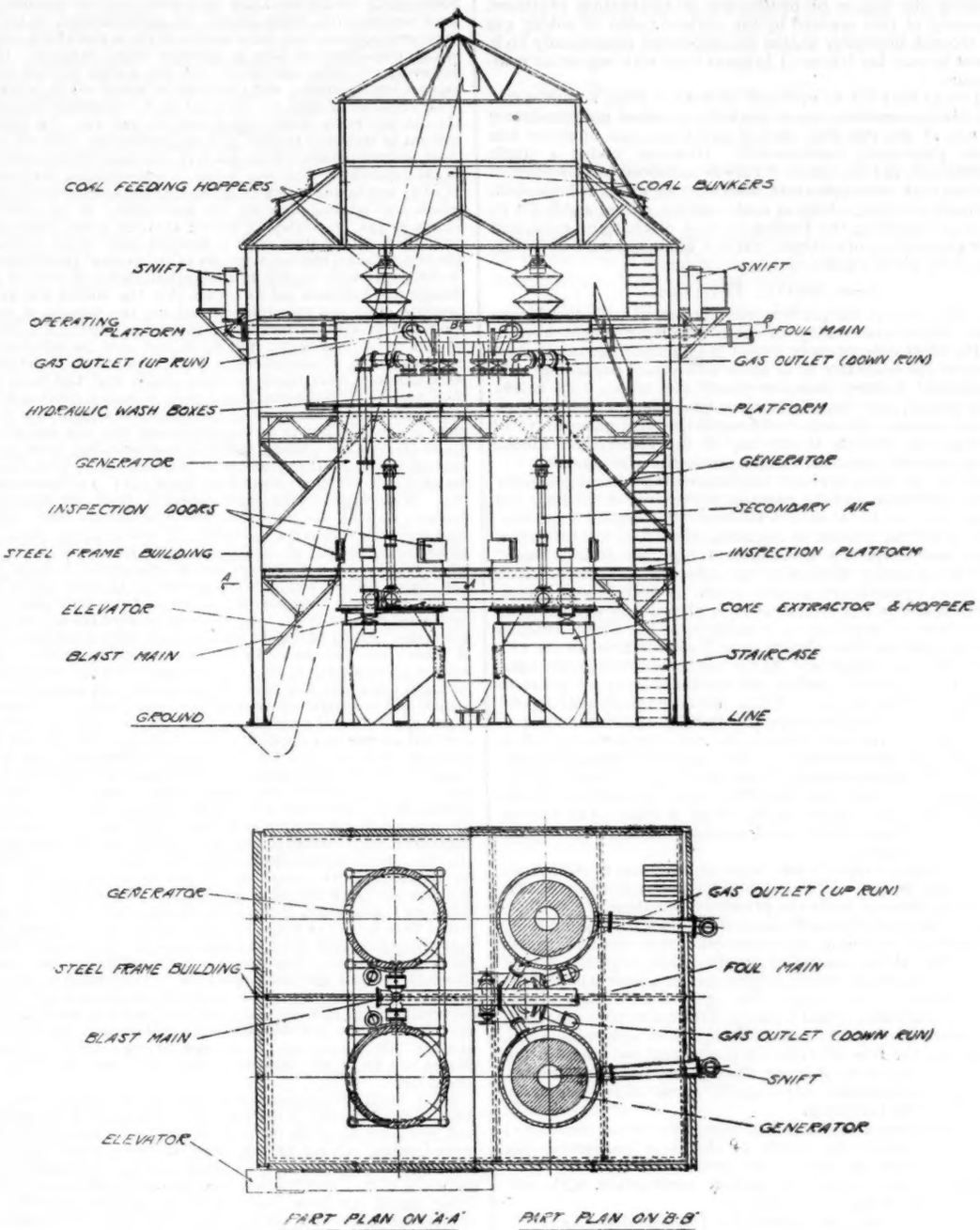
The main features claimed for the Moore system of gas generation are:

1.—It is a two-stage process, in which coal gas and water gas are produced in one operation.
2.—The proportion of coal gas to water gas may be regulated to produce any desired quality of gas, from at least 450 B.Th.U. down to 190 B.Th.U. (gross).
3.—The carbonization (or complete gasification, if desired) of any class of coal, coke, peat, or wood.
4.—The production of any desired quality of gas coke, and of tar and ammoniacal liquor.
5.—The coke (and/or tar) can be either produced or used in the generator; thus assisting to control local markets for these products.



MOORE'S GAS-GENERATOR, SHOWING COAL FEEDING HOPPER, COKE DISCHARGER, AND RECEIVING HOPPER, &c.

6.—The feeding of coal and the extraction of coke are performed without interrupting the regular gas-making routine.
7.—The heat required to gasify the coal is generated internally, with less of the fuel losses incidental to the use of external producers.
8.—A Moore installation capable of producing 2 million c.ft. of 425 to 450 B.Th.U. gas per day (or approximately 4 million c.ft. of blue gas if preferred) can be comfortably housed in a building 44 ft. long by 34 ft. wide.
9.—The Moore plant is so flexible in operation that, if sufficient gasholder storage is available, the works can be run without night work or Sunday labour.
10.—Where gasholder storage is limited, a Moore generator can be brought into operation on very short notice to meet emergencies.



MOORE'S GENERATOR PLANT AND HOUSE.

11.—A "relief" gasholder is not an essential adjunct when manufacturing Moore gas.

12.—There is no scurfing, no "sluggish" fire, and practically no clinkering.

13.—The coke-receiving chamber holds up to 2 tons of coke, and is discharged only once per shift.

14.—The steam supply is automatically reduced during each gas-making run, preventing loss of steam and excess of carbon dioxide.

15.—The secondary air supply is automatically accelerated during each blow, ensuring better combustion of the blast gases.

16.—A plurality of heating chambers round the retort provide a long travel for the blast gases to the snift-pipe outlet.

17.—The blast gases are evenly and equally distributed (by means of suitable circulating chambers and ducts) round the retort and from the bottom to the top thereof.

18.—The combination of Nos. 12, 13, 14, and 15, as described, results in a very short blow period being required (about 1 minute in every 7 minutes). Consequently, the output of gas per shift is considerably increased, coincident with reduced consumption of fuel for the blow.

19.—The gas produced from coal in the Moore gas-generator (whether by partial or by complete gasification) possesses the characteristic odours of coal gas, as required by the Board of Trade.

20.—The proportion of inert constituents in Moore gas has not been known to exceed 15 p.ct., but is usually less, if the coal is not overcharged with moisture.

The Moore generator can be worked to gasify completely the coal if desired. In the event of a shortage of coal, or in order to steady the coke market, the whole plant could be operated to take everything except ashes out of the coal; and the gas could then be enriched with liquids to the necessary standard—provision for so doing being made in each Moore generator. Alternately, a section of Moore generators could be worked to produce a moderately rich gas and a high-class coke; another section could completely gasify coal, or coke, as desired; and a third section might work for a medium quality town gas and medium quality coke. Again, a single generator could be worked to produce any of the foregoing results successively during stated periods each day. Thus the quality of the gas or coke can be readily altered or adjusted.

When the complete Moore generator plant is put to work, I confidently expect to produce economically a gas of much higher quality than 450 B.Th.U. But it is obvious that the higher the quality of gas the lower must be the bulk output per day, and less volume per ton of coal. On the other hand, while the best thermal results will be obtained by completely gasifying the coal, the consequent loss on residuals may be greater than most people anticipate. It has been my custom at Scunthorpe to supply just enough coke to meet demands.

Whatever the degree of distillation or gasification practised, the economy of fuel secured by the carbonization of coking gas coal in Moore's internally heated gas-generator is unusually high, and lower in cost for labour (I believe) than with any other coal-gas system.

It is just as easy for an operator to work a large 1-million c.ft. per day Moore generator as to work the smallest unit producing 50,000 c.ft. of gas per day; and, if necessary, one operator can work two generators satisfactorily. However, taking a single half-million c.ft. per day plant, it may be accepted for purposes of comparison that three operators, each working an eight-hour shift, can regularly produce a total of half-a-million c.ft. of 450 B.Th.U. gas per day, including the feeding of coal, discharging coke, and all other gas-making operations, but not including coal elevating, coke removal, plant repairs, or steam raising.

Some Special Features.

There are several unique features connected with the Moore generator which are worthy of more detailed notice. For instance, the blast gases cannot travel diagonally from the bottom to the top of the generator as is usual with plants possessing only one chequered heating chamber round the retort. As briefly indicated already, the Moore generator has several heating chambers which conserve the heat and compel the blast gases to travel evenly from the bottom to the top of the retort, and thence through a series of chambers before exit to the atmosphere.

In place of the usual firebars, the base of the Moore generator has a coke extractor, and the constant movement of the fuel, and its removal as coke (or as ash, in the case of "complete" gasification), *plus* a certain amount of steaming, minimizes the formation of clinker and keeps the incandescent fuel free from "dead" ashes. The extractor discharges the coke into a receiver, which reaches to, or beneath, the ground level. A sealed mouthpiece, for the external discharge of the coke, is placed 4 to 5 ft. from the ground, in front of, and fixed to, a radial chamber within which is placed a close-fitting tray hinged upon a spindle fixed to the two inner sides of the mouthpiece. As the extractor revolves, the back end of the tray is slowly lowered automatically from 40° above to a position 40° below its axis. When the tray reaches its lowest position, at the end of eight hours, the mouthpiece door is opened, and the raising of the tray causes the coke to discharge into a trolly or other suitable receptacle. The speed of lowering the tray is controlled by the movement of the extractor. A short fall for the coke is thus ensured, and undue breakage is prevented. In the larger generators, the receiver holds 2 tons of coke. The base of the receiver rests on or in the solid ground, and does not depend upon overhead support.

The coal feeding hopper holds 8 cwt. of coal, and is of Moore's improved static design. Both the coal feeding and the coke extraction are performed while the plant is gas making.

The desirability of effectually controlling both the steam supply and the supply of secondary air to gas-generators hardly requires emphasis. The Moore controller is actuated by a gentle drip of water raising a bell-float, which, in turn, moves a lever which shuts or opens a valve, as necessary. The special advantage of the Moore steam controller is that it can be adjusted to pass automatically full steam for (say) the first two minutes of a six-minute run, gently reducing the flow of steam for the second two minutes, and rapidly reducing the flow of steam during the last two minutes. These simple and reliable adjustments admit of any necessary variations from the foregoing.

Moore's secondary air control is similar to the steam controller; but instead of reducing the supply of steam, it accelerates the supply of secondary air during the continuance of each blow period—thus ensuring more satisfactory combustion, with consequent greater heat and shorter blow.

If my memory serves me aright, Sir Dugald Clerk, K.C.B.E., D.Sc., &c., one of the ablest and most observant of our leaders, declared a few years ago that the time was not far distant when the old methods of gas production would be superseded by a process in which coal would be carbonized with less of the thermal losses due to the wasteful system of heating retorts by means of external producers, which constantly demanded toll from the coke yard. While the Moore system of carbonization may not fulfil all his expectations, I venture to hope that the facts which I have disclosed to you to-day may prove to be at least finger-posts on the road to higher ideals and greater achievements for the great and growing gas industry.

DISCUSSION.

Mr. Moore, in introducing his subject, and in the course of the reading of the paper, enlarged upon many of the matters dealt with.

The President (Mr. H. G. Ruggles) said they were very much indebted to Mr. Moore for his interesting paper, which he had illustrated by a model and diagrams. There were present in the room some gentlemen who were particularly interested in complete gasification plants; while others, of course, had so far had no experience of them. Unfortunately, there was not a great deal to discuss in the paper. They could not compare costs, because they had not got any; but they would be very glad to hear the results when some of the plants were actually at work. Mr. Settle, Mr. Shadbolt, and Mr. Deeley were with them; and it would be a pleasure to hear their views.

Mr. R. G. Shadbolt remarked that it would be fitting that Mr. Settle should have premier place in this regard, on account of the pioneer work that he had done in connection with vertical retorts.

Mr. T. Settle said it was somewhat difficult for him to speak on the paper. They had been accustomed for a very long time to shocks in connection with carbonization; but these complete gasification plants, about which he did not know very much for the moment, seemed to have outdone the other systems of carbonization, to the extent that they were approaching more nearly to the actual therm value of a ton of coal than could be done in ordinary retort practice. He had not, however, yet gone sufficiently into the matter to feel competent to express any opinions; and therefore he would ask to be excused.

Mr. Shadbolt said he, too, felt in a somewhat difficult position. He did not quite know which side he was on. He took a certain amount of technical interest in total gasification; but the paper before them seemed to refer not so much to that as to the carbonizing of coal in gas-generators—that was to say, it was reducing the question to one of what was taking place in regard to the carbonization of the coal which was passing through the generator. If he understood Mr. Moore aright, he started by saying that his paper dealt with general principles, rather than with a detailed analysis of working results. He (the speaker) had not seen any of the general principles enunciated in the paper with regard to the carbonization of coal in generators, though one had been led to expect that the author was going to concentrate upon the principles underlying the passage of coal through the retort in total or partial gasification systems. Mr. Moore might be able to put him right; but, as he had said, he failed to detect any enunciation of principles which were involved in this method which were different from those in other plants that had been brought to their notice. It did occur to one that, in such a process as this, if one accelerated the throughput of the generator with a view to extracting more of the coke before turning into water gas, one was increasing the speed of the coal passing through, and bringing down partially carbonized coal from the retort on to the fuel bed. Was that the ideal material with which to make blue water gas? On the face of it, it was not. With regard to the paper generally, there was not very much to discuss; and he did not know which to admire most—Mr. Moore's courage or his extreme optimism, in venturing to bring forward a paper with details of working results which might be expected, when really such a plant was not in existence. If what Mr. Moore had placed before them that day proved to be accurate in every particular, he would have proved himself to have been one of the most successful experimenters who had ever entered the domain of gas engineering. Many of the claims advanced were common to other forms of plant; and this should be stated in justice to others. He did not wish to particularize at all; but he thought the best concluding remark he could make was that those of them who were engaged upon experimental and investigating work to day—and it must be borne in mind that there were many people at work on this and kindred problems, and that no one was standing still—would wish Mr. Moore every success that he deserved in his efforts in this direction; and they hoped that some of the expectations which he had been bold enough to place before them at that meeting might in due course bear fruit. But he would like to warn them one and all that the paper, without costs, &c., was a paper of expectation as to what might accrue when the various alterations, improvements, and so on, were put into practical working. He (Mr. Shadbolt) himself believed that there was a wonderful future for the gas industry—that they had not by a long way reached finality in connection with complete gasification. When such discussions as this were taking place, it did occur to him that in the near future they would have totally to gasify the fuel and its volatile products, tar, and everything else, and make the best possible use of the product. At the present moment, they were too much inclined to set themselves a standard, because the Gas Regulation Act suggested it, and to work to that. He thought they would be driven before very long by force of circumstances to take the fuels that lay nearest at hand, gasify them to the utmost extent, and then make the best possible use of the resultant product. Of course, conditions were varying every day; but it seemed now to him that this was the course the future of the gas industry would take.

Mr. J. Davis (Gravesend) said that if Mr. Moore's plant only did what it was expected to do, they would be perfectly satisfied; but he took the sting out of his paper by saying that it was only in the experimental stage. Could he tell them anything about actual results? Mr. Moore had not told them what coal he proposed to use in this particular plant; and that was the real *crux* of the whole thing. Mr. Settle would tell them that one of the greatest difficulties with the vertical retort was the hanging-up of the coal. This appeared to be more so with total gasification plant. He himself had such a plant, which was working admirably up to a point. He could get, and had got, 40,000 to 45,000 c.ft. of gas per ton. The difficulty was to fix the gas produced. If it was tested as it was coming from the plant, there was a beautiful illuminating flame—in fact, one would say it was 12 to 14 candle gas. But tested at a burner 15 ft. away, it would be found that one had practically a blue flame, singularly free from inerts, but with more than 24 p.ct. of carbon monoxide, and of about 320 B.Th.U. What was badly wanted was a separate chamber for fixing the gas. They would then be in the same position as with a water-gas plant. Mr. Moore stated that he got no difficulty with clinker; and this was rather extraordinary. With the plant he (Mr. Davis) had, he was using Durham coals. The chequer work shown by Mr. Moore looked very well; but he thought when it came to practical working they would get blocked up; and there did not appear to be any way of cleaning them. This was only one of the problems that he himself had found with the total gasification of coal. He quite agreed with Mr. Shadbolt that in getting a plant that would totally gasify coal, they would reach the height of their ambition. He did not see how Mr. Moore was going to get 6 cwt. of coke as well as 30,000 c.ft. of gas per ton. He certainly could not get 8 gallons of tar. He (Mr. Davis) was still making alterations on his plant; but he was doing very well with it, and would recommend it to any one who required such an arrangement. It needed well looking after—more attention than ordinarily, for it was very different from vertical or horizontal retorts—and there was that hanging. Of course, a good deal might depend upon the coal that was used. During the reading of his paper, Mr. Moore had made a remark about Kent coal, and the good coke it produced. This was perfectly true. He himself had had experience of Kent coal. But so far as the gas was concerned, he could not get more than about 8000 c.ft. of 8-candle gas per ton out of it. They must remember they were not coke, but gas makers.

Mr. A. G. LANE (Aylesbury) asked how the author proposed to generate his steam, and the pressure at which he would work.

Mr. J. C. DEELEY (Stourbridge) said it would ill-become him to criticize Mr. Moore's paper. That morning at the works many of them had seen a plant of expectations, and now they had just had a paper of expectations; so that gas engineers would remember their visit to Leighton Buzzard. There was one remark he would like to make, and that was with reference to the construction of the bottom of the generator. Coke was not a very easy thing to run out; and if the opening was made as narrow as shown by Mr. Moore, there must be some method of squeezing it that was not apparent. Mr. Moore said he was offering to gas engineers the possibility of being able to start-up plant, and then go home. Gas engineers knew that plant must be in accordance with their storage. This was a matter which every designer of plant had to bear in mind. The designer was restricted to the capacity of the works' storage, and other things over which he had no control. Would the author say how he had got over this difficulty?

Mr. SHADBOLT said it would be interesting to know what was the effect upon the coke that was withdrawn from the extracting chamber, which had been partly used for the formation of water gas.

Mr. P. D. WALMSLEY (Great Yarmouth) said there was one aspect he had been waiting very patiently to hear about, and that was the financial aspect. They seemed to accept it that total gasification was the ideal to be aimed at in every case. He respectfully submitted that, if the thing was analyzed properly, and a proper balance-sheet was made out, some of them would be very surprised to find how little there was in it. He was not going to say very much about what they were doing at his works at the present time; but they could make up to three-quarters of a million, and if required a million c.ft. of gas a day with five men; and they could sell 11 cwt. of coke per ton of coal carbonized, and had 10 to 10½ gallons of tar for disposal. When they came to weigh this up, he thought there had got to be a case made out for total gasification from an economic standpoint. As an ideal method of carbonization, well and good; but they did not run their works on ideal methods of carbonization. They ran them for the profit of the shareholders—and the benefit of the consumers. Total gasification might be the ideal for which they should strive in some cases; but he was certain it was not in his.

Mr. DAVIS said he would like to state, so far as he was concerned, that with the plant he had been speaking about he had increased his make per man from 22,000 to 40,000 c.ft.

Mr. WALMSLEY: We have increased ours to 150,000 c.ft. per man.

Mr. MOORE, in reply, said he had figures of results at Scunthorpe; but he wished to leave these to his successor, Mr. J. F. Simpson, to deal with later. As to the cost of the plant, he had not wanted to introduce this question; but he could tell them that his Syndicate were at the present moment preparing an estimate for a 1 million c.ft. per day plant (two ½ million c.ft. generators). For the plant, a house similar to a vertical retort house, overhead coal storage for 48 hours for each generator, with the necessary blowers, and everything ready for connecting-up to the outside, the cost would be slightly under £13,000. As to Mr. Shadbolt's question regarding accelerating the throughput, and partially carbonized coal coming down into the water-gas zone, he suggested that the richer the fuel going into the producer zone, the richer the blast gas would be, and the more heat they would get from this blast gas, which would compensate for the cooling caused by the quicker throughput.

Mr. SHADBOLT: Do you find that partially carbonized coal on your fuel-bed as good material for the manufacture of water gas as fully carbonized coal?

Mr. MOORE: If we extract coke for the sake of selling it, we make a richer gas, and require less water gas. We got 25,000 c.ft. to the ton with practically no steaming, and presumably without any water gas. Continuing, he remarked that, as regarded other types of plant to which Mr. Shadbolt had alluded, he did not desire to belittle any of them. Provided a water-gas plant was properly erected and properly handled, he had not met anybody who was sorry to have put one in—no matter whose plant it was. As to the quality of the coke, when extracting experimentally they found half carbonized coal rapidly extracted at the bottom produced a sort of coalite. The outside of the piece was hard, while the inside was green. It made a splendid smokeless fuel—he thought as good as any coalite. All sorts of coal had been put successfully through the plant, without any trouble; but his idea was that they were under an obligation to provide their customers with a certain proportion of coke, apart altogether from the question of complete gasification. To provide this coke, it was necessary, of course, to use a coal that would produce it; but if it was a matter of gas making only, all he could say was that he had made gas in this plant from every possible class of coal they could get—outcrop slack, and everything. Referring again to Mr. Davis's remarks, he could only repeat that they were getting 30,000 c.ft. of gas, 6 cwt. of saleable coke, and 8 gallons of good tar per ton. As to steam, his experience was that the higher the pressure and the drier the steam, the better was the gas both in quality and quantity. It was easy to provide steam-raising arrangements nowadays. In the case of Scunthorpe, he had recommended a Kirke boiler. The hole for the coke over the extractor was 2 ft. in diameter, which was found to be sufficient. At Scunthorpe, they were putting down a 500,000 c.ft. additional gasholder with some of the money they had saved by adopting this system. With reference to Mr. Walmsley's remarks on total gasification, if they read the paper properly they would infer that he agreed with Mr. Walmsley. As Mr. Shadbolt said, there were grand possibilities, in view of complete gasification. At the same time, they had not reached this stage yet. It depended upon the locality to a very great extent. There were people who would not be satisfied with less than 450 B.Th.U.

Yorkshire Junior Gas Association.—Last Wednesday afternoon the Association paid a most interesting visit to the works of the Leeds Fireclay Company, Ltd. Unfortunately pressure on our columns compels us to hold-over our report.

THE VAST OPPORTUNITIES FOR ARTISTIC AND EFFICIENT GAS LIGHTING.

By J. W. LOFTS, of Messrs. William Sugg & Co., Ltd.

[An Address to the London and Southern District Junior Gas Association, delivered on April 28.]

It is a very difficult matter to give, in the brief space at my disposal this evening, anything more than a superficial survey of the subject announced. Yet I hope that some profit, if small, may accrue from its consideration. So that concentration can be better given, the subject has been divided under various headings, which we will now consider in announced order.

I.—SHOP LIGHTING.

I suppose most of you can remember the flat-flame lighting period of shop lighting, when lamps of the hexagon or circular type, placed almost shoulder to shoulder, were employed. These lamps were 3 ft. wide, often glazed with bevelled edge plate-glass in the lower half and with opal tops; each lamp consuming about 30 ft. of gas per hour, to obtain the magnificent light of 150 candles, frequently with two or three lettered panes in each, advertising the name and business of the proprietor, and costing easily anything from £10 to £20 per lamp.

The discovery of the incandescent mantle (vertical type) enabled the consumption to be materially reduced, and at the same time a much greater illumination to be obtained; but for a time many of these large lamps were continued in use, after conversion to the incandescent type. It was not a great while, however, before it was realized that it was no longer necessary to employ such huge lamps; and those of the arc type were introduced, having a single glass globe of elongated (or pear) shape, and fitted with a cluster of upright mantles—two, three, or four in number. For advertising purposes, the half opal and clear globe, lettered on the opal portion, was employed, or advertising screens (separate from the globe) were attached to the lamp. The arc form of lamp undoubtedly increased the artistic effect of shop lighting, and at the same time it made for increased efficiency; for its adoption secured a much better effect with far less obtrusive display. Therefore, large lamps disappeared from shop fronts generally; the last instances in this respect being public houses, where the taste pretty generally had been for the employment of the largest, most glaringly ornate, and highly coloured lamps. We wonder to-day how such huge, obtrusive, and, in many instances, vulgar lamps were tolerated; but even now one sees here and there a relic of these past days, for some people are so disinclined to change, even to the point of ridicule.

The introduction, however, of the inverted mantle enabled bulk to be still further reduced, and artistic effect and efficiency further increased. Rapid strides were now made in replacing upright mantle lamps with the inverted type, employing mantles known respectively as the "Universal" size, the "Graetzin" size, and, later still, a larger mantle known as the low-pressure high-power size. Then followed the introduction of the superheated cluster form of small size mantle (the bijou and the medium bijou sizes), which very rapidly forged its way to the front—and rightly so, seeing that it is vastly superior to the separately controlled large size mantles last mentioned. It affords—

(1) 30 to 40 p.ct. better illumination, with the same consumption.
(2) A much lower maintenance cost; for the small mantles have a longer life than the large, and inner glasses are unnecessary.
(3) A single gas and air regulator to manipulate, instead of two, three, or four.

Realizing these great advantages, many gas undertakings have converted the shop lamps in their districts to this last-mentioned principle. Many others are engaged in doing so, and it is to be hoped, for the sake of efficiency, that it will not be long before large mantles—anything greater than the medium bijou size—will have disappeared entirely.

There is now on the market a splendid device, absolutely dependable, and which can be easily fitted to shop lamps, enabling them to be lighted or extinguished by the simple turning-on of a single tap fixed in some convenient position inside the shop, thereby avoiding the individual lighting of outside lamps, which now has to be done by the pulling of a chain or the pushing of a lever with a stick or pole. The employment of this device saves possible jarring of lamps and the disturbance of probable customers inspecting the window display, and therefore should most certainly be included under the heading of "efficiency."

From the artistic point of view, I should like to say that it is possible to obtain lamps to-day of the highest efficiency, and having at the same time graceful and artistic outline, at very little more cost, if any, than lamps which are inartistic. By artistic I do not mean scrolls or leaves or similar forms of external ornament, but artistic lines of lamp casing. These can be artistic or inartistic, graceful or vulgar; and, depend upon it, sooner or later, effect tells, and you have to pay the price for rudeness, whether of speech or outline. In this connection, a word or two should be said for brackets (or supports) used for suspending lamps from shop fronts. A little consideration as to the design of these would produce those of good, though simple, outline,

at no greater cost than for ones of inferior or inartistic design, of which too many cases are in evidence. The colour effect should also be considered. Where enamel casings are employed, a dark green or a French grey is to be preferred. Where copper casings are used, these can be made to take on a real bronze effect by merely rubbing over the casing with a duster every time the lamp is cleaned; and some very fine examples of this effect are to be seen in this neighbourhood.

As regards the interior lighting of shops, the style of fitting employed must, of course, vary with the design and character of the premises involved. The first principle is that ample light should be afforded to enable all operations to be carried on in every part of the shop without the slightest hindrance or inconvenience to either the selling or the purchasing side; thereby tending to produce that feeling of satisfaction and comfort on the part of the purchaser which only well-lighted shops can produce. The harmful effect of inefficiently lighted shops upon the would-be purchaser is very great. I care not whether it be drapers, outfitters, furniture, or other shops—good lighting always pays.

The lighting in every case should be without glare—a subdued effect is always best. The opal bowl in semi-indirect lighting and silica ware for direct lighting are of splendid assistance in this direction. Fittings not only efficient in duty but artistic in appearance should be aimed at every time—nothing in the design that readily collects dust or that is opposed to rapid and easy cleaning; no scrolls, leaves, fretwork, or similar abominations; surfaces that do not discolour and are unaffected by products of combustion. Distant lighting and extinguishing should be employed.

II.—Street Lighting.

I suppose that nine-tenths of the street lighting of the United Kingdom is carried out by the employment of the square type of lamp mounted on a cast-iron pillar; and providing the outline of the square lamp is correct in proportion, it requires a lot of beating. Modern lamps, of course, have metal, not opal, tops; flat reflectors of square shape extending across the roof of the lamp, preferably of porcelain, because of its higher reflecting duty; a superheated cluster of small mantles, as previously described, not a large one—the mantles being carried in focus of the reflector, and out of the way of cleaners when cleaning the side panes; and lighted by means of a bye-pass, a torch, or clock or pressure-wave controllers.

The great saving effected by the use of the inverted mantle has led a large number of authorities to convert their lamps from the upright to the inverted type. Unfortunately, adverse financial conditions imposed by the war have compelled a great number of authorities to adopt the swan-neck type of inverted fitting, which, although making for economy, can never be placed for artistic effect and efficiency in the same *régime* as the reflector type, in which the gas supply is led up one of the astragals, and carried over the reflector.

A certain provincial city converted their lamps (8439 in number) from upright to bijou inverted mantle cluster type, at a cost of £2304, and realized not only better illumination, but also a saving in the first year of £5305 in gas and mantles. The installation therefore paid for itself in five months, and then earned a dividend of 125 p.ct. These figures, one would imagine, are sufficiently powerful to convince all public authorities to do likewise. Yet there are some who still use upright mantles. Why?

As in shop lamps, so also in street lamps, the superheated cluster type of small mantles is now being fitted in place of large mantles—not in new lamps only, but in existing lamps; for a twin cluster of bijou mantles will afford equal lighting to a Universal mantle on a 25 p.ct. smaller gas consumption, or will give 33⅓ p.ct. better light for equal gas consumption. For promenade lighting, central or refuge lighting, and for important thoroughfares, the upright type of arc lamp is excellent, and has been widely adopted. These lamps carry up to 15 mantles, and give illumination of 1500 candles; but groups of two, three, or more lamps can be employed on one standard where a greater illumination is required.

The precincts of the Houses of Parliament are, as you are doubtless aware, lighted by means of specially-designed globe lamps fitted with the superheated cluster type of small mantles. Several of our bridges are now equipped with lamps on the same principle. Among others may be mentioned London, Southwark, Blackfriars, and Vauxhall. There is a fine stretch of this type of lighting in Hyde Park, parallel to Park Lane; and it has recently been installed in the lamps fixed on the railings, gates, &c., of Buckingham Palace. All the lamps served by the Wandsworth, Wimbledon, and Epsom District Gas Company are equipped in this manner. Of course, there are thousands of others; but I mention these instances near home.

III.—Railway Lighting.

Speaking in a general way, railway authorities were not slow in recognizing the great advantages of the small inverted mantle—in fact, they were among its first users. One of the principal companies, who lost no time in converting from the flat flame to the vertical incandescent type and then to the inverted large mantle type, converted again to the superheated small mantle as soon as its advantages were known; and to-day its lighting is arranged throughout on the last-mentioned system. This is real efficiency. Many other railway companies have already done a great amount of this conversion work, and are still engaged in doing so. Some companies adopted the arc form of light right away, as soon as it was introduced, for platform lighting under roofs and similar positions; but some companies held to the square lamp. Now practically all the companies have been won over to the arc form, because of its freedom from shadows, its greater artistic appearance, and its much smaller and much neater dimensions. In addition, increased efficiency in illuminating power and general upkeep is obtained. There are still a few instances where large and ugly lamps have been maintained and converted to the inverted type; but this method is to be deprecated.

Much attention has been given to the question of how best to display the names of stations on arc lamps where these are used; and the types of nameslips most in favour are the three now thrown upon the screen. For lighting platforms beyond the station roof covering, square lamps on cast-iron pillars, as already described for street lighting, are considered the best type; but for important stations, the upright form of arc lamp previously referred to is of course more "classy."

For the lighting of goods yards and similar places, square lamps with three and four light clusters of medium bijou mantles are now being adopted, instead of the large hexagon type formerly used, although some companies prefer the arc form of lamp suspended from a wrought-iron harp or swan neck. The superheated small mantle clusters successfully withstand the vibration caused by shunting operations in goods yards, also that set-up by fast-running passenger and goods trains; anti-vibrators being quite unnecessary, except in very exceptional instances. What splendid contributory evidence this is to the strength of the small mantles!

A great deal more could be said on railway lighting matters in regard to office, signal cabin, locomotive shed, and other special requirements; but I must hurry on. There is just one item, however, to which I would refer—viz., the highly efficient and artistic back (or wall) lamp, which is a great advance on the heavy type of wall lamp so often found in subways and similar places; also its companion lamp for ceiling fixing. Further, the method of distant control previously explained for shop lighting is adaptable to platform lighting, enabling a whole row or alternate lamps to be put out between the arrival of trains.

IV.—The Lighting of the Home.

I cannot help thinking that the lighting of the home, where we spend so much of our time, or at any rate where our wives and families spend so much of theirs, has not received the attention it deserves. The disinterestedness of many gas companies in this respect has caused a great number of nasty, so-called cheap, burners to find their way into the market, carrying with them trouble and dissatisfaction wherever they go. Here and there are found gas companies who devote skilled consideration to house lighting matters; but many do not. The consequence is that the public turn-down gas lighting as something to be avoided if electricity is at all obtainable—and, depend upon it, the experience gained in the home on gas lighting matters often operates prejudicially to gas when rival systems of artificial lighting are being considered for other purposes than home lighting.

Yet there are artistic and highly efficient fittings to be had for home lighting—fittings expressly designed for the purpose—neat and "classy"; fittings which give light, and which are equipped with effective gas and air regulators, capable of easy adjustment; fittings designed to permit of easy dusting, and which do not discolour, the globes of which are arranged to eliminate all glare and eye strain and its consequent fatigue, and are easily removable for cleaning. The users of these fittings avoid trouble, and obtain satisfaction in comfort, cleanliness, and in convenience. Small mantles should be used, either singly or in cluster; and the fittings themselves should be of O/S finish, generally speaking, for the drawing room and bedrooms; O/C for the dining room; and S/B for the kitchen—polished brass is not to be recommended, for it so soon discolours. Silica ware is recommended for globes, and silk shades to taste, with switch control for lighting and extinguishing.

V.—The Lighting of the Office.

It is of utmost importance that offices should be well and efficiently lighted, not only in boardrooms and managers' rooms, but right the way through. There should be nothing in the character of the fitting used that will interfere in any way with concentration of thought or the best work. Badly-designed and inefficient fittings militate against best results. Clean surroundings and appliances exercise a great influence upon the mind. Most certainly eye strain, with consequent fatigue, must be avoided.

Semi-indirect fittings, especially those equipped with opal bowls, are ideal for office lighting. Where ceilings are lofty, then semi-indirect fittings, provided with extensive reflectors, thus forming a ceiling of their own, should be adopted. Failing semi-indirect fittings, the inverted cluster type, with the lower half of the globe obscured and with opal shade to reflect rays in downward direction, should be installed. If desk lighting is preferred, lights fixed on desk pillars should have shades of green-cased opal and of deep design, so as to screen the eyes thoroughly from image of light; and where heavy books are being frequently taken from, or placed upon, the desk rails, the fittings should be of the anti-vibrating type, specially designed for this purpose. There is a very fine semi-indirect type of desk fitting now procurable, which affords upward light as well as downward. Where the direct type of desk fitting is used, supplementary top lights should be employed for general brightness effect.

Mention must be made of the ventilating type of fitting, fixed close up to the ceiling level, and which carries away, through a suitable shaft to the gas-fire flue, the vitiated air, and which does this in non-lighting as well as in lighting hours. I saw in an office the other day two instances of parabolic reflectors fitted at the back of ordinary inverted burners attached to wall brackets and without globes, so as to throw sufficient light on the desk for working purposes. What happens when the clerk looks up? Another case in the same office was a piece of brown paper attached to the shade of another burner to prevent glare. These instances are by no means uncommon.

VI.—The Lighting of the Factory.

Factory lighting demands special consideration. I prefer always to light a factory from actual inspection, not from plan. There are so many points to consider, and so many to avoid; and each factory requires special treatment. The Home Office has devoted much study to the question of factory lighting, and has issued certain reports relating to it; and rightly so, for the workers should be protected from possible accident through inefficient lighting, and also protected from eye injury through the same cause. Efficient lighting makes for increased production and for better work; and with efficiency I couple bright lighting —nothing of a gloomy description, yet complete avoidance of glare, with its pernicious results.

As a rule, machines require independent lighting, and the light placed in such a position that the machine operator can easily see to perform every operation without glare or strain of any description; and to obtain this effect there is often only one position where the light should be fixed. Supplementary top lights should be employed for general lighting effect. Long rows of benches can be lighted by overhead fittings, well up from the normal range of vision; and these, as well as lights fixed high up (such as above overhead travellers), can be controlled by means of the distant control previously mentioned. In only very few instances is it necessary to employ lights fixed on movable brackets.

Where excessive vibration is experienced, the tubular steel-spring type of anti-vibrator should be employed. This successfully overcomes all vibration; and it does not possess any rubber joints, which too frequently are a source of leakage and trouble.

VII.—Church Lighting.

The title of my address is most applicable to church lighting; for I am afraid the lighting of churches has been sadly neglected, with the result that inartistic and inefficient fittings are found in many of them to-day. It is frequently stated that church authorities have no money to spend on improved lighting, yet money is found to change-over from gas to electricity in many cases; and one presumes that electric fittings are not supplied free of charge, even to churches. If church authorities were given satisfactory gas lighting, the desire to change-over to electricity would not be so pronounced. Fittings used for this purpose should be of the superheated small mantle cluster type, having obscured bowls, either totally or partially obscured. The design of the fittings should be on ecclesiastical lines. It is inartistic to fix fittings, designed principally for shop use, in church buildings. Yet how often is this done?

Great care should be exercised in determining the correct position for the fittings and for the shading of the light; so that while ample light is afforded, all glare is eliminated and a subdued lighting effect obtained. A few cluster lights, each carrying one bowl, is so much better than a large number of individual burners on the corona principle. The distant control device is ideal for church lighting. Individual turning on and off of lights must certainly be avoided. There is an excellent burner obtainable with vertical feed, carrying a silica cylinder, specially designed for use on existing brackets and pillars. Although only a conversion fitting, it suits existing fittings as completely as if it had been originally designed for the purpose. Every fitting used, however, must be capable of fine and complete adjustment. Noise must be avoided; and therefore 6-hole gas-nipples should be employed to obtain quiet. A reliable governor should be fixed on the outlet of the meter, so that constant pressure is maintained, if the pressure exceed 25·10ths. There are some instances of satisfactory and successful church lighting in existence; but there is great and pressing need for many more.

VIII.—School Lighting.

My last heading is surely not the least important. The days have now passed when anything was considered good enough for the children. If you were to ask me what are the essential points for consideration to secure satisfactory school lighting, I would reply cleanliness, healthiness, cheerfulness. The fittings, therefore, should be of simple yet good outline, designed to avoid collection of dust as much as possible, with surfaces that permit of easy cleaning and which do not discolour. The burners should be capable of easy yet complete adjustment, and equipped with shades which completely screen the eye of pupil and teacher from image of mantles; and the lighting and extinguishing should be under easy control.

The London County Council have within the last year or so remodelled the lighting of a number of their schools on the above lines. Financial difficulties, however, unfortunately prevent their adopting ideal fittings in every case; but they endeavour to do so as far as funds permit. This is how their report reads: "Favourable reports have been received upon the experimental trial of improved gas lighting. A new form of superheated inverted incandescent burner is fitted with a special type of shade. Here is the report in brief: Ample, well-distributed light, saving in gas and mantles, globe eliminated, burners self-cleaning." To the credit of some education architects it must readily be agreed that they have always endeavoured to secure the best that can be obtained in lighting appliances; but in many cases very little attention has been given to this most important subject.

A Few Hints in Conclusion.

The various divisions of my subject have now been dealt with, very superficially I am afraid, but time would not permit of longer treatment. The subject is rather too great for complete survey in the compass of a single lecture. I trust, however, that the paper has earned its title. In the discharge of my business duties I visit all parts of the United Kingdom; and from observation in my various travels I am firmly convinced that vast opportunities do exist to-day for artistic and efficient gas lighting. It is very regrettable, however, that a number of gas undertakings do not take advantage of these opportunities. Some fail to act in any manner which might be termed "energetic" until seriously threatened by electricity; and then it is often too late to save the situation. Others are content with an apology for a showroom, in which may be found samples of cheap fittings—and these often in a most shabby condition—for domestic use, but in which is not shown anything in the way of fittings suitable for the shop, the office, the factory, and other purposes.

In some districts the gas undertakings do not sell any fittings to the public. Consequently, the public have to depend upon the gas-fitter or plumber. This is a great pity; for how is it possible for gas-fitters to keep themselves *au fait* with all the latest developments in gas lighting? Again, some companies go in for the cheapest fittings obtainable, regardless of efficiency or appearance, which is certainly a grave mistake. Others do not trouble to canvass their ground, either by circular or salesmen, and if inquiries are made at their office have no one on hand competent to deal with the situation. I believe in showrooms well designed, well stocked with up-to-date appliances, lighted by artistic and efficient fittings, internally and externally, and equipped with capable staff, having always on hand attractive circulars and literature for distribution. Further, I believe in canvassing the district in a thorough and complete manner, by competent representatives. Where these methods are practised—and they are in some districts—success is always achieved. No undertaking can be considered complete unless it comprises a competent maintenance staff. When business is obtained and satisfaction given, keep on affording satisfaction by efficient maintenance.

In opening the meeting,

The President (Mr. Frederick A. Frost, of the South Metropolitan Gas Company) said it was a very great pleasure to the members to have Mr. Lofts with them to give an address. Gas lighting was a subject to which all progressive gas companies were giving a good deal of time and attention; and the Association had been exceedingly fortunate in enlisting the services of Mr. Lofts, who was an authority on all matters related to lighting, and who possessed the additional recommendation of having been for a long period connected with the firm of Messrs. William Sugg & Co., who had occupied a prominent position in all the phases of gas illumination from its earliest days.

Each of the eight sections into which the address was divided was illustrated by a number of lantern slides of lamps and lighting installations. The main features were pointed out by Mr. Lofts, who was able to demonstrate, by the aid of these pictures and a number of polar curves, that the firm have the best grounds for claiming on behalf of their fittings great efficiency and a very high standard in artistic design. Much of the discussion that subsequently took place was in the form of questions relating to these pictures, and comments to which they gave rise.

DISCUSSION.

The President said there would be general agreement that the address was one which was in every respect worthy of the title which Mr. Lofts had given to it. He had tried, in the brief time at his disposal, to go through the important field of gas lighting in rather more than the superficial manner which he had indicated at the outset would be possible. One of the most important assets of any gas company should be its street lighting; and it had been very encouraging to learn that evening that a good deal of progress was being made in the provinces in this respect. From what one saw from time to time in provincial towns and cities, there was certainly much leeway to be made up. It was not always the smallest towns which were the biggest sinners in this matter. It did not seem either that such a thing as financial considerations need stand in the way of accelerating this work; for Mr. Lofts had given an instance of a provincial city who had converted 8439 lamps of the upright pattern to the bijou inverted mantle cluster type, at a cost of £2304. This was a matter of somewhere round 5s. a lamp; and it did occur to one that this was a particularly low figure, though Mr. Lofts had shown on the screen that the fittings installed were of a simple character. How did he accomplish this piece of work? If one could change over the lighting from the upright to the inverted system, and pay for it in five months and then earn a dividend of 125 p.ct., the sooner all those who had upright lighting got on to the job and finished it, the better for everybody concerned. The question of house lighting had been touched upon in the address; and it appeared that the remarks on the apathetic attitude of many gas undertakings towards this important part of their business were justified. The inevitable result where this attitude was adopted had been loss of business. The only solution of the domestic lighting problem was ceaseless propaganda. It was necessary to take

every opportunity of pointing out the disadvantage of using cheap and inferior mantles and fittings. The time would come, he thought, when makers of fittings would, in the interest of all concerned, employ only drawn tube.

Mr. D. J. Winslow (Lea Bridge) remarked that the paper had come at a very opportune time; and they were greatly indebted to the firm of William Sugg & Co. for the scientific methods which they applied to all their work. There were a number of points in the paper which were of interest to every one of them. With reference to the cluster type of lamp, it was fortunate that silica globes had come into use, as with this kind of lamp it was difficult to obtain an ordinary glass globe to stand. Mr. Lofts suggested the closed-in type of silica globe for the "Surbiton" lamp; but after a short time these become discoloured. Further, the loss of light was appreciable; and with the long cylinders the loss of light was also marked. He (Mr. Winslow) had obtained silica cylinders for this lamp about half the depth shown by Mr. Lofts, so as to cut off the direct horizontal light of the mantles, but to leave exposed the rays from 45° downwards; and this was very effective. For protection against mantle rings falling, he had made some fine copper-wire nets, which were hung from the globe holder by three holes with a fastening-ring inside. Had Mr. Lofts endeavoured to overcome the slight noise given by the "Surbiton" lamps? He had mentioned the six-hole nipple for use on burners to give silence; but where it was not always convenient to fix governors to ensure the pressure being kept down to 25-10ths, had he attempted to fix the ordinary gas regulating nipple, to be followed by a further nipple with the six holes? It appeared that this might be a likely method to overcome the slight noise. Regarding the lamp with a cluster of the small No. 2 mantles, the introduction seemed to synchronize with the lower calorific value of gas, with a great increase in efficiency. He would like to know if Mr. Lofts obtained an equivalent efficiency with a higher calorific gas —say, 560 B.Th.U. The distance control of Messrs. Sugg & Co. was a very effective apparatus; but he would suggest that the makers should give sketches or details of the working parts when introducing it to those engaged in the industry, as it was the practice thoroughly to know the working parts of an apparatus, to form an adequate conception of same. He supposed that the usual thin copper-wire nets were used in all glass-ware suspended in churches and public halls.

Mr. J. R. Gale (North Middlesex Gas Company), alluding to complaints about the quality of street lighting, said it was only fair to the industry to point out that in most instances the public lighting was under the control of the council or corporation, and not of the gas company. Frequently the company were quite powerless in the matter. As to churches, there was no doubt that noise had sometimes caused the loss of gas lighting.

Mr. W. L. Westbrook (North Middlesex Gas Company) asked, regarding the conversion job costing 5s. per lamp, how much was for labour and how much for material. It seemed to him that the men must have been pretty smart over the work. The manufacturers of gas-fires had been very successful in overcoming the difficulty of noise; and he often wondered whether somewhat the same principle could not be applied to incandescent lighting. It might be more effective than governing at the meter.

The President remarked that noises were not always connected with burners. Sometimes variations of pressure in the gas-main were responsible.

Questions having been asked by various members—including Mr. H. W. Kerridge (Croydon), Mr. D. C. Cross (Lea Bridge), and Mr. R. J. Behenna (Gas Light and Coke Company),

Mr. G. H. Lloyd (Gas Light and Coke Company) said there were vast opportunities for gas lighting. He was glad to hear mention made of the harm done to the gas industry by cheap and nasty burners and fittings. It was a great pity that so many were on the market, and that frequently gas companies did not take sufficient steps to combat them. Cheap burners and fittings were wanted; but they must be good. There was positive danger in many of the inferior fittings that were sold. There was a great opening for a burner which would be self-lighting, by the simple turning-on of the gas. Where the use of gas was only occasional, the bye-pass became a considerable question.

The President said they had with them Mr. Philip Sugg, and would like to hear a few words from him.

Mr. Philip Sugg (Chairman and Managing-Director of Messrs. Sugg and Co.) said it was a great pleasure to him to be there that evening; for it was the first time he had attended a meeting of the Association. He pointed out that the ultimate damnation for bad fittings—whether lighting burners, fires, or cookers—fell upon the gas undertaking, and not upon the manufacturer. A man who failed to obtain a good light from an inferior fitting would not blame himself for having purchased the fitting, but would say, "How bad the gas is." The firm which he (the speaker) had the honour to represent had endeavoured always to serve the gas companies and corporations by producing nothing but what would be to their mutual interest. He was glad to see so much more attention now paid to the quality of the apparatus through which the gas was used than was the case some years ago. The rising consumption of gas was largely due to the fact that the undertakings were now selling gas at the burner, whereas before they only sold it at the meter.

Mr. Lofts replied fully to a great many practical points that had been raised in the course of the discussion. With regard to the scheme carried out for the conversion of upright to incandescent burners, the place in question was the city of Newcastle-upon-Tyne; and the report upon which the information contained in his address was based had not been got-up by his firm or by the Gas Company, but by the City Fathers themselves. The figures he had quoted were contained in that report; and they were quite correct. It had been remarked that very often the street lighting was not in the hands of the gas company, but in those of an official like the borough surveyor. Frequently it was not even in the hands of the borough surveyor, but was under the control of the chief constable. He claimed that there was no noise in connection with church lighting fittings if one used six-hole gas-nipples, and a reliable governor on the outlet of the meter if the pressure exceeded 25-10ths. His firm could supply these six-hole nipples in which the centre hole was regulated and the other five surrounding that one were not regulated. These nipples would prevent noise. A great amount of prejudice in connection with the use of gas for church lighting would be swept away if the distant control device to which he had made reference in his paper were used. The trouble of turning on and off individual lights, and very often poor maintenance, had "fed up" people. In the case of church lighting, the gas company should undertake maintenance, and then satisfaction was given. Many gas-lighted churches were now giving complete satisfaction, where electricity had been threatened previously. The efficiency was equally as great with high as with low calorific value gas in cluster lamps, provided the lamp was suitably adjusted. With reference to the remarks that had been made about the use of seamed tube, he might say that all fittings supplied by Messrs. Sugg and Co. were made from solid-drawn tube, which certainly ought to be used in the case of every fitting. To-day there was to be had a British heat-resisting quality glass which did not break, and was quite as good as pre-war Jena quality glass. But they should always allow themselves a factor of safety, as the engineers did. That was to say, for shops or churches they should employ a fine copper wire net, which was almost invisible. For the lighting of a retort-house, nothing would beat the "Littleton" lamp with a superheated cluster of mantles. He knew of one engineer who used extensively the distant controllers referred to in the address, and who had given instructions that once a year the diaphragms were to be oiled; but there was no need to do it so often even as this. The suggestion for providing a self-lighting burner should be borne in mind; and they would hope that it might be discovered. A question had been asked as to lighting engineers' lathes, in which one had to show a light in a tunnel, as it were. He had lighted many engineers' shops; and by getting the light in a certain position at the end of the tunnel it was quite possible to obtain a good effect.

Mr. S. B. Chandler (South Suburban Gas Company), proposing a hearty vote of thanks to Mr. Lofts for his address, said that those of them who visited Messrs. Sugg and Co.'s works on the last occasion would remember that Mr. Lofts then made some remarks on the No. 2 mantle, and in consequence was prevailed upon to come and deliver this address. The anticipations then formed had been more than realized. He would like to say that, so far as the fittings were concerned, whenever he had had dealings with the firm of Messrs. Sugg and Co., he had found that the promise of good workmanship, high efficiency, and general functional effect had in all cases been proved by results to be true.

Mr. H. W. Kerridge (Croydon) seconded the vote, and declared that the evening had been a splendid success.

Mr. Lofts, in reply, said that it had afforded him much pleasure to give his address.

Sulphur Removal by Sodium Hypochlorite.

Two years ago the Executive Committee of the Wisconsin Gas Association suggested as a suitable subject for study, under the grant of the fellowship established at the University of Wisconsin, the problem of the removal of sulphur compounds from manufactured gas. A report on preliminary work was made twelve months ago; and in this Mr. E. C. Brenner detailed tests showing that by the use of hypochlorite, hydrogen sulphide was completely removed, but that carbon disulphide was only partially taken out. It was believed that carbon disulphide comprised the greater part of the organic sulphur compounds; and it was thought worth while after this report to repeat some of the earlier experiments on a larger scale, to determine whether the organic sulphur compounds could be removed more completely. The results of these later experiments were given by Messrs. H. R. Broher and O. L. Kowalke, at the recent meeting of the Association. From these experiments, the authors arrive at the conclusion that the major reactions taking place when sulphur compounds are removed from manufactured gas by means of alkaline hypochlorite solutions are as follows: The small amount of hydrogen sulphide contained in the gas used was oxidized to water and elemental sulphur; the chlorine of the hypochlorite going to sodium chloride. The elemental sulphur is slowly dissolved in the sodium hydroxide of the alkaline hypochlorite solution. Alkaline hypochlorite may react with carbon disulphide to some extent to form a carbonate and a sulphate; but, in addition to this reaction, carbon disulphide also reacts with hypochlorite to form carbon tetrachloride, and possibly a small amount of chloroform. The carbon dioxide is completely removed by the caustic in the hypochlorite solution. Unless the hypochlorite solution is maintained in an alkaline condition, carbon dioxide will liberate hypochlorous acid from the hypochlorite solution. Hypochlorite will have no action on carbon monoxide, hydrogen, oxygen, or nitrogen in the gas. The objection to the use of hypochlorites for the removal of organic sulphur compounds from manufactured gas by this method is the introduction of chlorine compounds into the gas. Upon combustion, these chlorine compounds are disseminated into the atmosphere.

Wolverhampton Engineering Society.—The final meeting of the session of the Wolverhampton and District Engineering Society was held at Wolverhampton on Monday. The President (Sir Walter H. Evans) was in the chair. The discussion centred round a paper by Mr. W. Stevenson, of Birmingham, relative to power production in the Staffordshire district, with special reference to gas-engines. Mr. J. Barker (Stockport) spoke from the standpoint of Diesel engines, Mr. A. T. Smith (Stoke-on-Trent) in regard to steam-engines, and Mr. T. Smith (Wolverhampton) in respect to electricity.

COKE-OVEN GAS FOR TOWN'S USE.

By T. NICHOLSON, of Willington, near Durham.

[A Paper read before the Northern Section of the Coke-Oven Managers' Association at Durham, Saturday, April 29.]

The author pointed out that within the past ten years increasing interest had been taken in the supply of gas for lighting and other domestic purposes from bye-product coke-ovens, not only in England but particularly in America and on the Continent. Before the erection of the bye-product ovens at Willington, his firm had for many years supplied gas to the district from a gas-works situated about half-a-mile from the ovens. When the bye-product plant was put down, no special provision was made for taking a supply of lighting gas from them; the idea developing later. The ovens were set going towards the end of 1910, and the town gas scheme, which he proposed to describe, was completed two years later; so that their experience of supplying town gas extended over ten years. The annual output was from 30 to 40 million cubic feet.

In 1912, preliminary experiments and tests were carried out on the coke-oven gas then being produced, from which it was concluded (having regard to the number of consumers still using batswing or flame burners) that enrichment of the gas would be essential; but that conclusion proved to be erroneous. For the purposes of enrichment he decided to use benzole, and examined the enriching values given to benzole by Stenhouse, Irwin, Bunte, J. F. Bell, and Hunt. To ascertain the value of ordinary 90 p.ct. benzole, he himself used a Kirkham and Sugg's improved Lowes jet photometer standardized with the No. 1 Argand burner. He found, finally, that one gallon of benzole would raise 24,100 c.ft. of gas by 1 candle-power. The following were the details:

Duration of test	3 hours	4 hours	3½ hours
Average candle power of enriched gas	17·50	14·38	13·97
Average candle power of unenriched gas	10·00	8·00	6·75
Gas passed through meter, c.ft.	7·55	10·00	9·15
Benzole used, grammes.	11·38	10·15	10·29
Number of candles the gas was raised	7·50	6·38	7·22
Benzole required per 100 c.ft. per candle.	0·049 galls.	0·039 galls.	0·038 galls.
C.Ft. enriched per candle per gall.	20,400	25,600	26,300

Average = 24,100.

Passing from the circumstances leading to the installation of the lighting plant, the following points were taken into consideration in determining what apparatus was necessary:

(*a*) The desirability of confining to night time only the taking of gas from the coke-ovens, or during hours when the collieries were not working; thus giving the fullest use of surplus gas for power purposes at periods of maximum load.

(*b*) Avoiding the costly arrangement of pipes, valves, and duplicate collecting mains, as was required to divide the gas into "rich" and "lean" fractions during the period of carbonization.

(*c*) Providing a margin for future requirements with facilities for taking the lighting gas required during each 24 hours as quickly as possible consistent with varying oven working.

(*d*) Utilizing the existing gasholders, purifying-shed, meter-house, and test-room on the site of the old gas-works.

(*e*) Simplicity in operating and applying to both batteries of ovens under any conditions.

Mr. Nicholson then described the type of plant from which the supply of gas was taken. The coking plant comprised 120 Semet Solvay waste-heat ovens built in four groups of thirty each—sixty ovens forming a battery; each battery having a separate bye-product recovery plant. The gas was collected in hydraulic mains; there being from each oven a separate serrated dip-pipe sealed in liquor. In this respect the apparatus was identical to that used in ordinary gas-work's practice. The average temperature of the gas leaving the hydraulic main was about 80° C. Between the ovens there were 18-in. dividing walls, which were independent of the heating flues; and these walls took all the weight of the superstructure, thus having, in effect, a construction similar in all respects to the arches of a gas-retort bench. In other words, the lining of the ovens could be removed with the same ease as in the case of a worn-out setting of retorts.

Each oven was fitted with cast-iron door frames, with hinged door on the ramside and lifting door on the discharge side. The coal was compressed, and the charges filled the ovens to within 5 in. of the top of the oven, when the charging peel was withdrawn. The standard coking period was 32 hours. Ammonia recovery was by the indirect method. Bubble washers and rotary scrubbers were used; while the benzole was recovered in rotary scrubbers too. The town gas was taken off at the outlet of the exhausters (the point of maximum pressure); the connections and valves being so arranged that the supply could be taken from either battery. The gas at that point contained traces of tar fog, 90 to 100 grains of ammonia per 100 c.ft., sulphuretted hydrogen, a little naphthalene, and required further cooling during the warmer months. It was, therefore, passed through the following train of apparatus:

1.—A vertical water-tube condenser capable of reducing the gas to atmospheric temperature.

2.—A Livesey washer, 5 ft. by 3 ft. 6 in., filled intermittently with benzolized creosote to remove tar fog and naphthalene.

3.—A 5-ft. diameter Holmes rotary scrubber to remove the ammonia.

On the outlet main of the scrubber a "Maxim" carburettor was fixed for enriching with benzole; but it was not now used, as enriching had been found unnecessary. The liability of over-exhausting, or the effect of the slightest over-pulling in working coke-ovens was, in his experience, far greater than in the case of working retorts; and it was lack of appreciation of the practical possibility of overcoming this difficulty without fractionation that led him to conclude that enrichment would be necessary. At that point the gas left the coke-oven plant, and was conveyed by an 8-in. main to the site of the old gas-works half-a-mile away, where the sulphuretted hydrogen was removed in four luteless purifiers 25 ft. by 12 ft. 6 in., filled with oxide of iron, worked on the backward rotation system. These purifiers were part of the special apparatus installed, and took the place of four small boxes which were only capable of purifying about 6000 c.ft. per hour. The retention of these old boxes would have necessitated taking gas for the town during the whole of the twenty-four hours, which was undesirable from every point of view. On the inlet of the purifiers the pressure was controlled by a Peebles mercurial governor, which was weighted to pass about 25,000 c.ft. of gas per hour.

On leaving the purifiers, the gas was measured with a Marsh's rotary meter, and thence passed into two 55 ft. diameter single-lift gasholders, which delivered it to the district at an initial pressure of 30-10ths to 33-10ths without the intervention of a station governor. In an attendant's test-room immediately adjoining the meter-house, there was a jet photometer connected to the outlet of the rotary meter, which showed the candle power of the gas as received. While there was no relationship between the candle power and calorific power in a gas irrespective of its composition, yet, when dealing with a particular gas from day to day made under the same conditions, the jet photometer was a most useful apparatus for indicating irregularities in quality; and it was with this instrument alone that the attendant at the gas-works and the foreman at the coke-ovens concerned themselves during the time the gasholders were being filled.

Calorific tests on the district supply were made daily at the coke-works laboratory as a check, and the results of these tests showed that, under the conditions named, observation of the illuminating power was quite satisfactory as a practical guide. Taking their daily tests over a period of two years, the average calorific value of the gas supplied had been 476 and 479 B.Th.U. respectively; while the following was a representative analysis after purification:

Carbon dioxide	2·00	2·00
Oxygen	Trace	
Illuminants	2·40	
Carbon monoxide	4·80	15·17 p.ct. inerts
Methane	23·68	
Hydrogen	53·95	
Nitrogen (by diff.)	13·17	13·17
	100·00	
Candle power (No. 1 Argand)		14½ – 15½
Sulphur compounds (Referees' test)		10 grains per 100 c.ft.
Sulphuretted hydrogen at inlet of purifiers	maximum 460	grains per c.ft.
	minimum 190	
	average 340	

Dealing with the removal of sulphuretted hydrogen, Mr. Nicholson said that the chemical reactions which took place in the purifiers when gas containing H_2S was passed through oxide of iron ($Fe_2O_3 . H_2O$), resulted in the formation of ferric and ferrous sulphides; and the partial oxidation of those sulphides in the purifiers by the intentional admixture with the gas of oxygen in the form of air, resulting in the precipitation of free sulphur, was commonly practised. The ideal to aim at, however, was the continued oxidation of the sulphides in the purifiers until such time as the oxide contained sufficient free sulphur to make the material saleable as spent oxide. This result they found no difficulty in achieving with coke-oven gas at Willington. Theoretically, 0·5 of oxygen was required for every 1 p.ct. of H_2S; and as the sulphuretted hydrogen never exceeded 0·7 p.ct., it was not difficult to account for the presence of 0·35 p.ct. of oxygen—the maximum required to bring about this result.

The backward method of rotation to which reference had been made consisted in advancing the last purifier in series to the first position as soon as H_2S appeared on the outlet of the third in the series. Thus the cycle of changes, with four purifiers working according to that method, would be:

At start	1	2	3	4	
First change	4	1	2	3	
Second ,,	3	4	1	2	
Third ,,	2	3	4	1	and so on.

It would be observed that the effect of this method of rotation was to give each purifier when last in series a period of rest, or a period when there was no sulphuretted hydrogen present. Mr. Nicholson described tabulated results of tests which were

designed to show whether or not oxidation took place in the presence of H_2S—*i.e.*, while sulphiding of the oxide was going on—and, if so, to what extent. To settle the points, the systematic tests would need to be carried on for a longer period.

Mr. Nicholson briefly outlined the provisions of the Gas Regulation Act. In view of this Act, it was interesting to note the different grades of gas that suppliers had already declared. He quoted the Gas Light and Coke Company at 500, in place of 475 previously declared, the South Metropolitan Company 560, in place of 550, and Tottenham 500, in place of 450, as instances. With such diversity of calorific grades as they showed, said Mr. Nicholson, it might be asked what, in theory, constituted a satisfactory gas for town use. In order to answer such a question, it was to be remembered that, notwithstanding the numerous and varying uses to which town gas was put, those all depended upon the production of gas of either power, heat, or light; and even the production of light became one of heat in an incandescent burner. Therefore, gas which failed to produce satisfactorily these three essentials—power, heat, and light—could not be regarded as a suitable gas for town supply. It should, of course, be understood that he was speaking of light through incandescence. So far as power from gas was concerned, it had long been generally recognized that gases of low calorific value, even as low as about 130 B.Th.U., answered that purpose admirably.

Closely following a strike which interfered with the normal running of their ovens and caused a cessation of the gas supply, he received a pressing request from the proprietors of the local cinema to let them have something which would run their gas-engine to start the movies again. Only gas of 260 B.Th.U., with inerts up to 55·4 p.ct. (of which 53 p.ct. was nitrogen) could be given that night. On the following day, they received an unsolicited testimonial to the effect that the gas-engine had never worked better. But, of course, the town was in darkness, though the street incandescent lamps were lit. This brought him to the much discussed topic of inerts or incombustible constituents in town gas, principally nitrogen and carbon dioxide. While the gas he had just alluded to acted so admirably in the case of the gas-engine, it failed to incandesce a mantle, and therefore gave proof that all the essentials to which he had alluded were requisite in a town supply.

The question would be asked, what part the inerts played in the latter state of things. The answer was, of course, that such a high percentage of inerts reduced the flame temperature too much for the production of incandescence in a mantle, and for other high temperatures required for brazing and the like. From this it would be apparent that a limit must be placed on the total inerts present in gas if it were to fulfil all the requirements of a town supply. The Research Committee of the Institution of Gas Engineers findings appeared to show that nitrogen might be present in coal gas up to 25 p.ct., and carbon dioxide up to 10 p.ct., without interfering seriously with its value for producing heat or light. His reason for referring at some length to the Gas Regulation Act of 1920 was to show that while the coke-oven *per se* may not be an attractive method of carbonization to the gas engineer to instal in his own works, yet, having regard to the recent legislation, coke-oven gas must have attractions to the gas industry generally as an auxiliary supply in all cases where it could be secured on favourable terms coupled with some reasonable guarantee as to continuity of supply. It was in this direction only, in his opinion, that the extended use of coke-oven gas for town purposes would proceed.

The author concluded with thanks to Messrs. Strakers and Love's Agent (Mr. R. L. Weeks) for permission to read the paper, and to Mr. R. R. Murray for his assistance in preparing it.

Wood and Vegetable Fuel.

Discussing, in the pages of the "American Gas Journal," the question of the fuel of the future, and arguing that this fuel will be gas, Mr. Thomson King, of Baltimore, deals with wood and other vegetable products as a fuel source that is constantly replenished by Nature, and one which will be of importance when the mineral fuels have been so far depleted as to become relatively much more costly than they are to-day. He points out that the rate of plant growth depends very largely on the proportion of carbon dioxide in the air; the great proportion of plant tissue being carbon, which comes from the carbon dioxide in the air. Supposing the actual amount of carbon now burned in the world in the shape of coal, oil, gas, and wood to be 1500 million short tons a year, as each pound of carbon unites with 2·66 lbs. of oxygen, the amount of carbon dioxide liberated into the atmosphere by fires in a year is 5490 million tons. The atmosphere now contains only 0·03 p.ct. of carbon dioxide; but as even this small percentage amounts roughly to 2,614,590 tons, it would take 476 years to double the quantity now in the air, though none was used up by vegetation. Nevertheless, Mr. King says, the time may come, as the use of fuel increases, when the rate of vegetable growth may be enormously increased by the larger percentage of carbon dioxide in the air. It has been estimated that plant growth now produces annually 32,000 million tons of vegetable matter, which, if burned, would develop heat equivalent to that derived from 18,000 million tons of coal. It is, he argues, certain that in the far-distant future this vast quantity of potential fuel cannot fail to play a more important part in the world's supply than it does to-day.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Market Values of Gas Stocks.

Sir,—With reference to the letter from Mr. F. A. Gulland, the Secretary and Accountant of the Maidstone Gas Company, which appeared in last week's issue, I may say that the price 53-55 as published in the "Journal" is the official quotation given in the Stock Exchange Daily List. This price (which I quite agree is unreasonable for a stock paying a 6 p.ct. dividend) has apparently remained unchanged because there has been no recorded transaction in the stock since Jan. 14, 1920!

It is not an unfrequent experience for stocks and shares thus neglected to get out of harmony with actual values which a recorded transaction would at once render apparent.

Companies in provincial towns which have Stock Exchanges of their own are independent of London quotations. Thus, the local quotation of Newcastle and Gateshead is 74-76; and the stock was done a few days ago at 72. But the London List quotes 57-59. Similarly the local quotation of Sheffield "A," "B," and "C" is 89 92, but London quotes 70-75 for the "A" and 68-73 for the "C."

April 27, 1922. Stock Market Contributor.

Mr. H. E. Jones and Calorific Standards.

Sir,—I should like to pay a tribute to Mr. George Keillor for his valuable paper on the present state of knowledge and practice in the fuller development of calorific value from coal carbonization. In the fullest, frankest, and most fearless manner he has recited and examined analytically the claims that have been put forward by various innovators in the practice of steaming as applied to vertical retorts as contrasted with careful and efficient carbonization on the old lines which do not call for costly reconstruction of the existing retort plant.

For myself, long since, studying anxiously the whole question, ever since the voluntary acceptance of calorific value testing in 1912 (closely followed by Mr. Hunt in the same year), I have been puzzled by some of the reports of extraordinary results from selected coals by steaming, and I am glad to see "the bottom" of them closely examined by Mr. Keillor and contrasted with other practices. In my opinion, he has "knocked" most of "that bottom out" and shown the miracle had little foundation.

In the old days, with the help of cannel or other enrichment, and with the poor old 16-candle test burner, we made 10,000 c.ft. per ton of 17-candle gas, to read 16½ or so at the test station.

On my formula of the calorific value this meant 6,300,000 B.Th.U. With the Carpenter burner (a godsend), we easily reached 12,500 of 14¼ = 6,686,000 B.Th.U. By steaming in horizontal retorts and with the very best Durham selected coals, the late Mr. Carpenter (of Sutton), made, at very low cost indeed for labour, fuel, and purification, 15,000 to 16,000 c.ft. of 450 B.Th.U. = 7,200,000. Following his practice with modifications, but without the very best (only medium) Durham coal, one of my larger companies is getting over 7,000,000. It will be seen that this is nearly 5 p.ct. above the general average I have mentioned.

As Prof. Vivian Lewes told us long ago to put our water gas through the coal-gas retorts, this result is not beyond expectation; indeed my friend, Mr. Croft, and his assistants expect to improve on it.

Of course, by devoting coke to water gas and enriching by American oil, one can wander into any sort of figure; but should we not be destroying the excess calorific value of the coke in doing it?

Mr. Keillor's paper comes very *apropos* for me, as I am anxious to compare these modest figures with the real average vertical steaming as directed to produce decently good gas not too far below the pre-war conditions. In saying this, I do not decry the valiant efforts of the low graders; for, bless them, they are fighting the battle I indicated in my paper of 1902 on "The Gas of the Future," where I pleaded for something between the Mond gas I had been advocating for industrial use and the fancy article I was being compelled by Parliament to supply, and which I felt could never "meet the market" I was aiming at.

I have been looking for the balance-sheets of the low-graders to guide me, and therefore have felt rather sorry to see that two of our larger Metropolitan companies have gone up in declared values rather heavily, and have so gone back to the 500 B.Th.U., which practically restores the old 14 candles with 40s. forfeit on the first ½ candle of defect.

In 1912 I accepted for the Wandsworth Gas Company a standard of calories equal to about 480 B.Th.U. In the war and strike emergencies one found excellent service (provided full pressure was maintained) from 405 to 410; and I am satisfied that the low-graders are on the right path.

But let me point out that our partners, the consumers, have sunk a great deal of capital in their domestic fittings, and have, besides that, fitted to them stoves with our own assistance, and that such fittings can only be made available with much higher service pressures and larger meters than we have hitherto provided. We cannot expect the consumers to provide, especially at present prices, larger fittings, so we must give them the extra pressure necessary. This involves loss by the extra gas got by those favourably circumstanced by unmeasured compressed gas, but it is the only alternative to throwing upon the consumer further capital cost which may decide him to forego the stove.

If any of your readers will consider and estimate the total capital sunk in gas fittings and appliances, I think they will be surprised. Apart from that, the company's own outlay on coin supplies is staggering; and especially so to the rating surveyors, as "tenant's capital."

Palace Chambers, Westminster, April 25, 1922. H. E. Jones.

High Therm Results with Vertical Retorts.

SIR,—If Mr. Wm. Everard Davies will do me the honour of referring to my paper again, he will find that I do not say that vertical retorts and other carbonizing systems are incapable of being designed to yield 100 therms of 425 B.Th.U. gas, or more, per ton of coal. All that I have said is that 30,000 c.ft. per ton of 400 B.Th.U. gas and 90,000 c.ft. per three-ton Glover-West retort per day have not been obtained, as a matter of every-day practice, from existing vertical retorts.

What did the Gas Investigation Committee send their experts to Uddingston for? To verify these and other claims, of course. Did they succeed? They did not. But I must not anticipate the adjourned discussion which may take place at the annual meeting of the North British Association of Gas Managers in September.

Reference has been made to the work of the Fuel Research Board, as if their results were unknown to me. The work of Sir George Beilby and his very able staff is of the utmost value; and though their results point the way to higher fuel economy, I am afraid it will be a long time before their academic methods become regularized practice. He would, indeed, be a bold business man who dared carry, in existing settings, the temperatures observed and obtaining in their specially designed settings. With a knowledge of all essential matters entering into this business question, and when using average Scotch coal, I dare say the Fuel Research Board's results are quite unattainable in vertical retort-settings as at present designed and supervised. I give this as the opinion of an intelligent "user," and not as a gas-plant maker or patentee.

Might I suggest to those who succeed in obtaining very high carbonizing results over a lengthy period and on a commercial basis, that they should now have them investigated and vouched for by either the Gas Investigation Committee or the Fuel Research Board, before publicly advertising them as reliable.

Would Mr. Davies please explain what he means when he says he desires "to correct certain errors under which, clearly, he (meaning myself) is labouring on account of unacquaintance with certain essential principles of thermal efficiencies, and which it is clearly the duty of a gas-plant maker to understand, but which are rather a matter of pure interest or curiosity to the user"? A very enigmatical saying this, and, as I interpret it, illogical and untrue, if "user" means engineers and managers in charge of gas-works. According to Mr. Davies, the true solution of the problem lies in *his* keeping; but at the moment he prefers not to state precisely what it is. If the solution is not the adoption of his patent fuel distillation system, which I happen to have shown an interest in and have been curious about as a "user," then, for the sake of all concerned, I hope he will not long delay making the secret public.

I thank Mr. Davies for his personal felicitations.

GEORGE KEILLOR.

Inchgreen Gas Works,
Greenock, April 28, 1922.

SIR,—I regret to find Mr. George Keillor misunderstands the purport of my supplementary comments, made with a view to amplifying certain points referred to in his valuable paper on "Thermal Efficiencies." Far from "poking fun," I intended my remarks to give all honour to Mr. Keillor for the very fine treatise which he gave on behalf of lower calorific values, although not participating in his pleading for the claims of low calorific values as against high in view of the necessity for impartiality on my part therein. But I share with Mr. Keillor the view that advantages may, under circumstances, definitely obtain for higher calorific values, and *vice versâ* for lower calorific values.

Respecting the critical remarks made by me, I wish Mr. Keillor to understand that they were intended in a good constructive sense, with a view to obtaining amendments to his apparent conclusion that the future promised little beyond a certain limit. Perhaps the expressions used by me were both too specific and ambiguous at one and the same time, and so confused Mr. Keillor as to the purport behind; but, believe me, they were made in quite a disinterested spirit, free of personal considerations, bias, or prejudice, with the sole object of emphasizing that something further remains to be added to the sum of our information on gas manufacture in either sphere—high or low calorific values.

Nevertheless, I agree with Mr. Keillor if (as probably he does) he means that, on present lines of plant design and operation, we have reached a point more or less of finality, and, consequently, without changing the system root and branch, little development beyond Mr. Keillor's 80 therm 425 B.Th.U. gas limit can follow. All I had in view was bringing to notice that the scepticism with which I thought Mr. Keillor viewed any such developments was quite out of place. By certain modifications by way of successfully embodying essential principles upon which retorting plant should be designed, the present attainments can be far exceeded. I may add that, although I agree that thermal efficiency may be bought with disadvantages elsewhere, it cannot generally be so, as the thermal question should embrace and determine the other factors to a very great degree, and does so when effectively embodied.

The context of the word "user" seems to have caused some difficulty; but surely it cannot be limited to the gas engineer and manager, or even to him and his staff. It embraces all who govern by their actions the chain of operations involved in making and using gas. It need hardly be pointed out how varying are the qualities of this "collective personal equation" from place to place, and how different the opportunities for its expression under various working conditions, &c. For example, on large-scale works it is possible and customary to effect manipulations and supervision not economically realizable on smaller plant according to present systems. There is, then, a general opening for standardized co-ordinated plant capable of operation by fewer, even though more skilled, hands per unit. Inevitably is the gas engineer as head the principal or directing "user"; but well-disciplined hands —incidentally facilitated when the plant under control is elastic and adaptable to a variety of expression, thereby giving an opportunity for manipulating talent to exercise itself—are an essential asset to the gas engineer in realizing efficiency in all respects. Likewise the makers involve a chain of contributory parties, all of whom are important agents in realizing the final result.

Evidently two collective contributory parties—users and makers—are necessary to the progress of gas manufacture beyond the present agreed top general limit of (say) about 80 therms of 425 to 450 B.Th.U. gas according to the coal used. In this chain I consider the gas engineer occupies a pivotal position, but hardly highly specialized on the latter side.

I trust soon to be able to reveal my secrets regarding thermal and other efficiencies consonant with and contributory towards all-round advantages in the other important and determining factors of gas manufacture—upon which my particular contributions are founded.

I admit that had certain essentials been successfully embodied previously, the problem would have long been solved, and evidently, as some of Mr. Keillor's remarks witness, he has been groping along the lines I mean, even if negatively; but I must regrettably ask Mr. Keillor to have patience and await the disclosures which will follow at no very distant date.

All improvements are at first academic; but the sooner, or the readier, they are capable of practical translation and embodiment, the better for all "interested" parties. And co-operation between the several interested parties—users, consumers, and makers—in gas manufacture cannot but surely have one worthy reward—a cheap supply of good gas and a prosperous industry.

WM. EVERARD DAVIES.

119, *Victoria Street, S.W. 1,*
May 2, 1922.

Comparative Thermal Efficiency Tests.

SIR,—The protagonists in the above controversy seem to have overlooked the long-period results actually obtained, and published in the "JOURNAL" as far back as Nov. 5, 1918; and for the benefit of readers they are repeated in condensed form.

Results Obtained on "Dempster-Toogood" System at Central Works, Oldham.

1 week's period	. . . .	460	B.Th.U. gas	..	108	therms
1 " "	. . . .	487	" "	..	107	"
1 " "	. . . .	480	" "	..	102	"
13 " "	. . . .	451	" "	..	100	"
13 " "	. . . .	476	" "	..	95·8	"

These results are, of course, the blending of carbonization with gasification, which blending has not by any means been fully exploited; so that even greater gaseous thermal yields may assuredly be anticipated from steamed continuous vertical retorting.

H. J. TOOGOOD.

The Poplars, Elland, April 29, 1922.

SIR,—I think it advisable to correct the misstatement in Mr. W. C. Goodchild's letter that the cooker burner tests given in my recent North British Association paper are not comparative. Mr. Goodchild has evidently misinterpreted the "Editorial Notes" referred to. My figures are strictly comparative, as anyone reading the paper with ordinary care can prove.

With regard to incandescent lighting, it was only necessary for me to prove that gas of 400 C.V., in properly adjusted burners as used in our homes, gives a better light and higher thermal efficiency than 563 C.V. gas in existing domestic appliances. There are those you know who have denied it. The three bijou mantle cluster burner referred to does not give as high an efficiency with 563 C.V. gas as with 400 gas.

What I am for the moment concerned with are the average conditions of supply and use in the home, and not the conditions pertaining to the laboratory.

GEORGE KEILLOR.

Inchgreen Gas-Works,
Greenock, April 29, 1922.

Tar for Roads.

SIR,—Your correspondent, Mr. Dudley W. Walton, raises the allegation recently made in the columns of the "Daily Mail" as to deterioration of modern coal tar.

Recent conversation that I have had in several directions seems to indicate that the fault is that some of the tar supplied is too thin; indeed, one user tells me that it flows over the road so rapidly that occasionally he has to bolt for his life.

From various parts of the country it is reported that petroleum residue or natural bitumen is to be mixed with the tar to thicken it. If the distiller prepared his tar in accordance with a test for consistency, such admixture would be unnecessary.

HUGH W. JAMES.

South Metropolitan Gas Company,
Tar Works, Ordnance Wharf, East Greenwich, S.E. 10.
April 26, 1922.

The Man Wanted in Gas Sales Development.

SIR,—The interest displayed in this important matter—as evidenced by Prof. Cobb's communication which appeared in "The Gas Salesman" for the 26th ult., and the editorial in the "GAS JOURNAL" of the same date—is surely very encouraging to those who, like the writer, are striving to foster the joint application of commercial ability and technical training to the selling side of the industry.

The writer was invited to give his views on this point, and did so at some length in the article "The Man Wanted" [see "The Gas Salesman," Jan. 25], which was primarily written for the purpose of arousing interest and creating comment. In this direction the writer's humble effort seems to have achieved a result; and it is a tonic to him, as a young man, to have his opinion confirmed, and more strongly emphasized, by such a distinguished gentleman as Prof. Cobb. As the Professor remarks, the matriculation standard was suggested "as some guarantee of good general education." This was exactly how the writer intended the matter to be understood. If reference is made

to the article in question, one will observe that under the heading "Fundamental Education" the writer talks about "a foundation upon which to build," and later on adds his desire "to indicate this *modest* standard (matriculation) of *basic* education." There is nothing in his article to suggest that such a standard suffices. It is not assumed that this carries us as far as it is desirable to go; but it is, obviously, a move in the right direction, because, as the writer has already said, "there must be a foundation upon which to build," and some juniors in the service of gas undertakings have to provide for themselves in this connection after leaving school and turning-out into the world. They are keen and desirous of building a foundation, and, therefore, need a little guidance in the matter of suitable curriculum. At any rate, this is the observation of the writer, who, it may be mentioned, comes into contact with a good many lads. Again, as the writer understands from the Editor, it is the aim of "The Gas Salesman" to help all deserving men to get up the ladder, and, particularly, to get hold of "the young blood."

The writer wishes to assure Prof. Cobb that he fully realizes the need for (as the Professor remarks) "a much higher scientific and technical education" than is indicated by matriculation; but one has, of course, to bear in mind the practicability of suggestions in the light of financial considerations. The salaries at present offered appear to be scarcely attractive enough for the secondary school lad, to say nothing of the university graduate. Banks and insurance offices offer better scope!

The writer wishes also, before concluding, to refer to the editorial in the same connection. Naturally, the desire *is* to "soar higher." But before such motion can be continued, it has got to be started. The impression the editorial gave the writer was that, through inappreciation of the scope of the work, his view was a narrow one; that he was stopping short. This is, however, hardly correct. A commencement must be made. The building-up process can then be proceeded with. A policy that would be ridiculed and ruled "out-of-court" if applied suddenly, can very often be made effective by gradual means. Apart from this, if one could be assured that young men of the suggested standing were to-day coming into the selling side of the industry, we could justly record an advance. We should be moving along a progressive track towards the higher sphere which the Professor and the Editor rightly suggest.

The Writer of the Article, "The Man Wanted."

May 1, 1922.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Progress of Bills.

Doncaster Corporation Bill: Read a second time, and committed.

Stretford and District Gas Board Bill: Read a second time, and committed.

Birmingham Corporation Bill: As amended, considered; to be read the third time.

Petitions have been lodged against the Stretford and District Gas Board Bill by the Manchester Corporation, owners and occupiers of property and consumers of gas in the urban districts of Sale and Urmston, Manchester Ship Canal Company, and companies and firms owning works and property in Trafford Park.

Gas Regulation Act, 1920.

Copies were presented of the Gas (Charges Orders) Rules, 1922, and the Gas Regulation Act (Appeal Procedure) Rules, 1922.

LEGAL INTELLIGENCE.

CLAIM AGAINST THE LIVERPOOL GAS COMPANY FOR DEMURRAGE.

On Friday last, Lord Justices Bankes, Warrington, and Atkins heard an appeal by defendants in the case of *The Attorney General v. Liverpool Gas Company** from so much of the judgment of Mr. Justice Roche of Dec. 19 last as ordered defendants to pay £2304 13s. 8d. in respect of demurrage. The action was brought to recover £3312 8s. 6d.; being the balance purchase price of 7076 tons of gas coal delivered to the Company in August, 1919, upon the terms that they would pay such price for the same as was reasonable, which price amounted to £19,967 10s. 4d., less £16,655 1s. 10d. paid.

Mr. Disturnal, K.C., and Mr. Tindal Davis appeared for the appellants, the Attorney General and Mr. Bowstead for the defendants.

Mr. Disturnal said this was an appeal against the judgment of Mr. Justice Roche given on the trial of an Information by the Attorney General to recover the balance of the price of a cargo of gas coal which was furnished by the Coal Controller to defendant Company. The total price of the 7076 tons was £19,967 10s. 4d., and the dispute was as to a sum of £2304 13s. 8d. paid by the Coal Controller for demurrage on the ship which brought the coal from the Tyne to Garston. The learned Judge held that the sum paid for demurrage was part of the price of the coal; there being no actual agreement as to what should be paid to the Coal Controller for it. In July, 1919, there was a serious strike in the Yorkshire coalfields, and there was a fear that public utility undertakings would find themselves short of fuel for making gas. In that state of things the Coal Controller offered this cargo of coal to the Company, and it was delivered by a ship called the *Levenpool* which was diverted to Garston. The ship arrived on Aug. 1, 1919, and demurrage was charged for 12 days 16½ hours, which was the item in dispute. Defendants paid the invoice price of the coal and the freight, and then in November the bill was rendered for demurrage. On inquiry being made for the charter, it was found that it was dated Oct. 31, 1919, and purported to be executed by the shippers in defendants' name, though it was not signed by the authority of defendants, and they accordingly repudiated it.

Lord Justice Bankes: The real question is whether demurrage is part of the "reasonable" price of the coal.

Mr. Disturnal said damages for breach of contract would not include demurrage. The coal was on board ship for a foreign destination when it was commandeered by the Coal Controller and diverted to defendants' works. There was no question that the Company were liable to pay for the coal, and, in fact, they had done so.

Lord Justice Bankes: Was there any evidence that the ship could have been discharged sooner?

Mr. Disturnal said the evidence was that at the time there was some congestion, and the men would not work in consequence of the wet weather. Defendants were never told anything about demurrage until months after the coal had been delivered.

Lord Justice Atkins: If you had bought on c.i.f. terms you would have had to pay demurrage.

Mr. Disturnal said there was no question of c.i.f. or f.o.b. terms. The learned Judge held that defendants had to pay a reasonable price for the coal, and "reasonable price" simply meant delivery at the defendants' works.

Without calling on respondent's Counsel, their Lordships dismissed the appeal with costs, holding that the conclusion to which the learned Judge arrived was the proper one.

* See "Journal," Vol. CLVI., p. 824.

A COAL TAR AGREEMENT.

Interesting Evidence about a "Ring."

In the King's Bench Division on Thursday last, Mr. Justice Salter heard an action by the Tottenham District Light, Heat, and Power Company against Messrs. Bowker and King, of Fenchurch Street, E.C., in which plaintiffs sought to recover from defendants the sum of £5786 odd for coal tar supplied to the defendants from plaintiffs' works upon an agreement dated March, 1919.

Appearing for the plaintiffs, Mr. Montgomery, K.C., explained that the agreement was the continuation of an arrangement of a number of years' standing. There was no dispute about the quantities supplied; but the defence was based upon the contention that in respect of coal tar delivered in the months of November and December, 1920, and January and February, 1921, the defendants had paid at a higher price than they should have done. They claimed to set-off, from the plaintiffs' claims of £5786, the sum of £5352 11s., and said they had tendered the difference due to plaintiffs of £433 11s. 8d. There was a counter-claim in respect of plaintiffs' failure to supply further tar which, however, would largely be decided by the result of the present claim. The defendants' contention arose in this way. Under the contract, the prices were to be fixed according to the average monthly market prices as determined by W. H. Brown & Co., of Fenchurch Avenue, and defendants were to pay a premium of 5 p.ct. upon the net amount of the monthly invoices. For the period to March, 1921, the average price was determined at 4·332d. per gallon, and the total due, including the premium, was £3798 14s. 10d. In April the determined price was 3·828d. per gallon, and the invoice came to £1987 7s. 10d. The defendants said that in respect of prior deliveries in November and December, 1920, and January and February, 1921, they paid £15,345 4s. 1d. on statements of price by Mr. Mackintosh Williams, as representing Walter H. Brown & Co., which statements determined the average monthly market price of pitch, and were expressed to be "only provisional" or "nominal" and were subject to adjustment. Then, it was contended, in May, 1921, Mr. Williams determined the average price of pitch for November and December, 1920, and January and February, 1921, at 70s. per ton; and, therefore, the defendants' liability for those months was only £9992 13s. 1d., instead of £15,345 4s. 1d. It was in these circumstances that the defendants put forward their claim to set-off as against the account for March and April, 1921. Counsel added that the plaintiffs' case was that it was never understood that the figures fixed for November and December, 1920, and January and February, 1921, on which defendants paid, were provisional or subject to later adjustment. His (Counsel's) case was that the terms "provisional" and "nominal" were not similar—the prices were nominal which meant the price in the market as near as it could be estimated.

Mr. *Samuel Glover*, who until February, 1921, was Engineer and Manager of the St. Helen's Corporation Gas-Works, in his evidence, said his works made the following sales of pitch to Manchester buyers for shipment: November, 1920, 49 tons at 200s.; December, 1920, 118 tons at 180s.; January, 1921, 180 tons at 110s.; and February, 1921, 121 tons at 90s. Replying to questions in cross-examination by Mr. Alexander Nielson, K.C. (for the defendants), he said he believed the prices fixed by Mr. Williams would be f.o.b. London prices and higher than local prices. He believed the tar distillers and producers did from November to March endeavour to maintain the price of pitch.

Counsel: Their efforts were not successful?—*Witness:* I do not admit it.

There were great stocks of fuel on the Continent and trade was bad, asked Counsel?—The market in pitch was increasing up to December.

Business in pitch was practically impossible from March?—New transactions possibly were, but business was going on.

New transactions decide the market price for the time being?—Yes. I attended meetings of distillers at this period not as a gas representative, but as an assessor of tar values.

Mr. Neilson told his Lordship that the parties had dealt together for years on a system by which the price of the tar was fixed by Mr. Mackintosh Williams. Through the autumn of 1920, the tar distillers

and the gas companies, including the plaintiffs, tried to keep-up the price of the goods.

Mr. MONTGOMERY said that was incorrect so far as the plaintiffs were concerned. They were never asked.

Mr. NEILSON: At any rate they were to get a handsome profit by it. The efforts to keep-up the price continued for some time, but buyers in South Wales, France, and Belgium would not buy and the people here would not sell, and there was complete stagnation from November to March. Mr. Mackintosh Williams, in the circumstances, found great difficulty in fixing the price, for there was no business doing, and, having to fix the prices, he could not do it with any degree of accuracy. To enable matters to go on, therefore, he fixed figures in his certificate which were approximate, working them from nominal market value. There could not be a real market price if there was no business. The word "nominal" appeared only in the particular certificates dealing with November to February, and payment on this basis could not be regarded as definite or binding, because it was not a real price. Consequently, the defendants said it was unjust that such a nominal price fixed with a view to later readjustment should be made binding upon them.

Mr. *Mackintosh Williams* (tar assessor) gave evidence that at the relevant periods the price of all these products was high. Pitch consumers were refraining from buying, and it became known that consumers in South Wales, France, &c., were co-operating in abstention from buying. The producers asked the Tar Distillers' Association to call a meeting, to which manufacturers of pitch were invited with tar assessors who fixed market values for distillers or gas companies. It was agreed not to sell to France (which country was in the position of having to buy on a large scale) unless there was an offer from a French combination of consumers. The French got pitch from Italy, South Wales, and Belgium; they insisted on Germany giving pitch in reparations, and bought none from the combination here, with the result that the market disappeared. In November to February he gave certificates of "nominal" market values, and recorded in some cases "no business done." It was impossible to fix a market price; and it was his intention subsequently, if asked to do so, to determine a definite price. Later, he returned 70s. for March, 60s. for April, &c. He fixed the 70s. also for the previous months when pitch had been unsaleable.

Upon the counter-claim, it was contended that the defendants were entitled to receive, in respect of the plaintiffs' failure to deliver the tar after the rupture between them, damages based on defendants' loss of profit; and evidence was given of the difficulty of obtaining large quantities of tar from July to September after the plaintiffs' had ceased deliveries.

Mr. *F. Bruce* (of the defendant Company) told the Court that his Company were entitled under the agreement to all plaintiffs' surplus tar. This was crude tar that had been resold to Burt, Boulton, and Haywood, the profit to his firm being 10 p.ct. on the selling price, or about ½d. per gallon. This crude tar could not be bought on the market against the plaintiffs, who delivered no tar from June to December, 1921, inclusive.

In his judgment, Mr. Justice SALTER found for the plaintiffs for the amount claimed, with costs. He held that upon the counter-claim the plaintiffs had committed a breach of contract in stopping deliveries, and directed judgment for the defendants for a sum equivalent to ½d. per gallon on the surplus tar that should have been delivered from June 1 to October 31, 1921; that sum to be determined by an accountant. His Lordship said he thought the prices marked "nominal" by Mr. Williams did represent his determination of the average market price according to the agreement, and defendants were liable with regard thereto and not entitled to any set-off.

Imprisonment for Stealing Gas.

On Monday, at Woolwich Police Court, John Henry Easterbrook, fitter, was sentenced to a month's imprisonment with hard labour, for stealing gas belonging to the South Metropolitan Gas Company. It was stated that in consequence of information received by the Company, a surprise visit was paid to the prisoner's house, when it was found that the meter had been disconnected and a fresh connection put in. A stove was burning gas which had not passed through the meter.

Disconnecting Pipes from Meters.

At the Birmingham Police Court last Friday, William Baker, of Great Brook Street, Birmingham, pleaded guilty to disconnecting a gas-meter from a pipe, and also to fraudulently preventing the meter from registering the quantity of gas supplied. He was ordered to pay £5. George Henry Potter, of Park Lane, Aston, was similarly fined for a like offence. In this case, evidence was given that a heating-stove had no trace of connection with the gas-meter.

Unlawfully Laying a Gas-Pipe.

At the Sheffield Police Court, the Gas Company proceeded against a man named Albert Fulford, who was charged with unlawfully laying a pipe communicating with the pipe belonging to the Gas Company, without their consent. Defendant pleaded "guilty." Mr. Scorah (who prosecuted) said that on March 22 one of the Company's inspectors looked at the meter in defendant's house, and found that one of the connections had obviously been tampered with. In consequence of this, he made a report; and the Company visited the defendant's premises. One of the officials found that the meter had been disconnected from the service main at one end, and from the outlet-pipe at the other end. The two disconnected pipes were joined by a rubber tube. Defendant admitted that the pipe had been in use for ten months. A record in the books showed that gas consumed from 1915 to 1917 averaged 8000 c.ft. per quarter. From 1918 to 1922 the average dropped to 3000 c.ft. Mr. Hawson (for the defence) contended that defendant installed the pipe owing to the poor supply of gas, which he considered was due to the condition of the meter. The Magistrates imposed the maximum penalty of £5 and £4 6s. costs.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Barnsley Gas Company.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 4s. per 1000 c.ft. within, and 5s. beyond, the town of Barnsley; and the price they have asked the Board of Trade to substitute for these is 16·6d. per therm whether within or beyond the town.

Bradford-on-Avon Gas Company.

The standard prices now authorized in respect of the supply of gas by the undertakers are 4s. per 1000 c.ft. within the parish and urban district of Bradford-on-Avon, and 4s. 8d. in any other part of the limits of supply; and the prices they have asked the Board of Trade to substitute for these are 19·56d. and 21·05d. per therm.

Bexhill Water and Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 22d. per therm.

Glastonbury Corporation.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 7½d. per therm.

DECLARATIONS OF CALORIFIC POWER.

Gowerton Gas Company.—450 B.Th.U. (July 1.)

GAS REGULATION ACT ORDERS.

There have been received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Aberystwyth Gas Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 18d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-one-tenth.

Prepayment meter clauses are included. (April 25.)

Barnet District Gas and Water Company.

As from the declared date: (1) The maximum prices of 16d., 15·4d., and 14·8d. per therm respectively shall be substituted for the prices of 4s. 6d., 4s. 3d., and 4s. per 1000 c.ft. mentioned in section 42 (price of gas in Barnet Local Board district) of the Barnet District Gas and Water Act, 1872 (35 and 36 Vict., Ch. clxxxix.), and the words "0·6 of a 1d. per therm" shall be substituted in that section for the words "3d. per 1000 c.ft." (2) The price of 19·6d. per therm shall be substituted for the price of 6s. per 1000 c.ft. mentioned in section 43 (price of gas within residue of Company's limits) of the Act of 1872. (3) The price of 16d. per therm shall be substituted for the price of 4s. 6d. per 1000 c.ft. mentioned in section 72 (price of gas within the district of East Barnet Valley Local Board) of the Barnet District Gas and Water Act, 1883 (46 and 47 Vict., Ch. cc), and the proviso to that section shall be read and have effect as if the words "42s." [per ton of coal] were substituted for the words "16s. 3d." and the words "0·6d. per therm" were substituted for the words "3d. per 1000 c.ft." therein. (April 14.)

Bristol Gas Company.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15d. per therm. (April 20.)

Shotley Bridge and Consett District Gas Company.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 16d. per therm. (April 21.)

Truro Gas Company.

After the declared date: (1) The standard price in respect of gas supplied by the undertakers shall be 18d. per therm; (2) the words "2·4d. per therm" shall be substituted for the words "1s. per 1000 c.ft." in the third proviso to section 77 (dividend dependent on price charged) of the Truro Gas Act, 1906 (6 Edw. 7, Ch. clxvi.).

In regard to power gas, it is stated that "notwithstanding the making of this Order, the provisions of sections 61 to 76 inclusive of the Truro Gas Act, 1906, shall continue to apply to the undertakers unless those provisions are amended by Special Act of Parliament, or by an Order under the Gas Regulation Act, 1920."

Prepayment meter clauses are included. (April 20.)

Bombay Gas Company, Ltd.—At the annual meeting of the Company on Thursday, the 11th inst., the Directors will report that the profit for the year ended Dec. 31, as shown by the net revenue account, after allowing for interest and exchange, amounts to £23,852 15s. 5d., making with the £25,713 8s. brought forward from the preceding year, £49,566 3s. 5d. available for dividend. Deducting the interim dividend paid in December last (£11,200), and placing £805 0s. 10d. to reserve fund and £537 0s. 2d. to renewal fund, there remains £37,024 2s. 5d., out of which the Directors recommend a dividend of 4 p.ct. (less income-tax), making 8 p.ct. for the year, which will leave £25,824 2s. 5d. to be carried forward to the current year.

BRITISH COMMERCIAL GAS ASSOCIATION.

MIDLAND DISTRICT CONFERENCE AT COVENTRY.

Coventry received, last Thursday, a first visit from the Midland District of the British Commercial Gas Association—the meeting being held under the auspices of the Corporation. St. Mary's Hall (historic hall of the Trade Guilds) was placed at the disposal of the conference; and the Deputy-Mayor (Councillor J. I. Bates, J.P.) sat throughout the long day an interested listener to the proceedings. He acted in place of the Mayor, who was unable to be present, by absence from home consequent on an illness of some weeks' duration. There were also present several members of the Corporation Gas Committee; and the delegates from towns in the area of the conference were numerous. Mr. P. N. Langford, Engineer and Manager of the Gas Department, made the arrangements. There was an exhibition of salesmen's appliances and utensils, and a literature stall.

Alderman J. H. Lloyd, M.A., J.P. (the Chairman of the City of Birmingham Gas Department), was President; and he and all the visitors were given a cordial welcome.

The Deputy-Mayor took the chair at the opening, and, after speaking of Coventry's ancient buildings and general associations, referred to the old prediction of forty years ago about "gas being on its last legs." That, he said, had proved false. While in 1884 the Coventry works produced 185 million c.ft. of gas, last year the production was 1777 millions.

President's Opening Remarks.

Alderman Lloyd said it had fallen to him to take the chair; and therefore, on behalf of the Association, he thanked the Deputy-Mayor for the welcome he had given. During their ten years of existence, the "B.C.G.A." had done good work in bringing before the gas consumers of this country in many and varied aspects the question of gas supply as it affected the home, the factory, and other phases of national life. Considerable progress had been made during the life of the Association, not only in the gas industry itself, but also in the abolition of smoke. Sir Oliver Lodge, among others, had declared that the burning of raw coal must cease; and it was to this end that the gas industry was directing its efforts. They must persistently advertise the advantages of gas. All were aware of the excellent work of the "B.C.G.A.," whose advertisements were now so universally displayed in all forms of periodicals throughout the country. This form of publicity could not be otherwise than beneficial to all gas undertakings. It followed that all, therefore, should support the efforts of the Association, because it was not fair that a few undertakings should stand aloof, and yet participate in the advantages which directly and indirectly were derived by local gas concerns from the work done nationally by the "B.C.G.A." Local advertising was itself necessary, and in certain directions was peculiarly effective; but general advertising could only be effectively carried out by a body like the Association. He congratulated the Association on their Fairy Gas Competition. In Birmingham, they supplemented the prizes by additional local ones; and he was very pleased to hear that there were 1000 entries from their area of supply. With the accumulated funds represented by the subscriptions received from the many hundreds of gas undertakings, the Association were able to carry out most effective propaganda work on behalf of gas through national circulating mediums; while the Association, representing as they did the great majority of the gas undertakings of the country, were able to put forward weighty views before Royal and other Commissions who might be inquiring into problems affecting public life, &c.—as instanced by the recent Smoke Abatement Commission. While they realized that the abolition of the smoke evil would not come about suddenly, they must see to it that they kept the question as a strong plank in their programme, and continually advocate an ever-extending use of gas for all purposes, and so ensure not only a brighter and healthier atmosphere, but economy and efficiency in the utilization of the coal resources, and also greater prosperity to the gas undertakings in this country.

The Association's Policy.

Mr. W. M. Mason (the Manager of the Association) next outlined the work and policy. They had, he said, to combat ignorance, prejudice, and competition. The organization was not a mere fairy thing, but an integral part of the gas industry. There was prejudice on the part of doctors and architects; and the Association did good work in showing the value of gas in the modern home. The public needed educating on the subject. Theirs was not an anti-electricity campaign, but a pro-gas one. They spent much money in making the merits of gas known, and in many ways aided publicity. They did not dictate to managers the price at which gas should be sold, but helped them to sell in the best possible way and to cheapen cost.

Mr. Langford gave some local facts to the conference. Coventry, he stated, joined the Association two years after it came into existence, and had whole-heartedly supported the objects. The benefits derived from membership were such that there were no regrets about joining a live organization. Since 1914, the total production of gas showed an increase of 42 p.ct.—and this in spite of the acute depression of the past year. The war prevented the exploration of many fields of use for gas; but now an extension of works was projected, and this would enable the Corporation to conduct a most vigorous selling campaign in the future.

MODERN GAS SALESMANSHIP, DEVELOPMENT, AND SUCCESSES.

Mr. H. H. Creasey, of the Gas Light and Coke Company, then read the paper on this subject which he presented to the recent conference at Blackburn—see "Journal" for March 29, p. 770.

Discussion.

Mr. A. W. Smith (Birmingham) urged that the work of the Association should always be followed up by the efforts of individual producers. He was afraid that some were apt to rely too fully on the Association. He put it that smoke-abatement was an ideal to which managers could set themselves. The difficulties of past years had now given way to a strong desire to secure business; and he invited all who were interested in gas sales to inspect the service exhibition at Bingley Hall, Birmingham. Garage and motor houses afforded a new field for gas use.

Mr. Hubert Pooley (Leicester) gave a number of facts in relation to that town, and stated that the city's maintenance work was about to be developed.

Councillor Tucker (Walsall) called attention to the difficulty experienced in giving satisfactory flat-flame burners to working-class dwellings; while the alternative of costly mantles was not welcomed in these houses. Hence builders were not always willing to instal gas.

Mr. Creasey said his Company aimed at educating the public to the incandescent burner, and encouraged its use by giving samples.

Mr. J. Paterson, M.A. (Cheltenham), stated that the working-classes in his town were purchasing their own incandescent fittings; but the Gas Company had gone back to pre-war illumination. He advocated local efforts in advertising, in addition to the general scheme carried out by the Association.

Mr. R. J. Rogers (Birmingham) said it was desirable that undertakings should know the real possibilities for expansion in their several localities. On the house-illuminating question, he stated that, in housing schemes, Birmingham had put-in pendants, and the tenants had generally provided incandescent burners. The public had to realize that the days of flat-flame burners had gone. There were now appearing incandescent mantles which, with proper usage, lasted, in industrial places, for a year; and this would meet the case of the working-class home. He urged co-operation between gas undertakings and fitters, and said such co-operation worked well in his city.

Councillor Read (Chairman of the Coventry Housing Committee) said more care than at present should be given in the provision of efficient fittings in houses, so as to eliminate unpleasant odours.

Luncheon.

The Chairman and members of the Gas Committee of the Corporation entertained the visitors to luncheon at the Masonic Hall—the Deputy-Mayor presiding.

The President proposed the toast of "The Coventry Corporation and the Gas Committee;" and from his life-long connection with Birmingham, Alderman Lloyd was able to note the changing industrial history of Coventry, and how the city had "gone under" and renewed its life again and again.

The Deputy-Mayor, replying to the toast, said the local population advanced from 106,000 in 1911 to 130,000 in the following decade; while the gas consumption, in spite of electricity competition, leaped up considerably.

Councillor Cleverley proposed "Our Visitors;" and Councillor Hilton (Chairman of the Leicester Gas Committee), in reply, made a point about the value of gas-fires, now that prejudice against them was dying.

Problems of the Day.

On the return to St. Mary's Hall, the conference was addressed by The President, who said they in the gas industry realized that to some extent they were looked upon to-day with hardly the same favour as they were a few years ago. Rising prices in some instances hit the producer harder than the buyer; and in the gas industry this was particularly so. As they were all aware, coal rose enormously in price; so did labour charges and materials generally. They might not be aware, though, of how very adversely the increase in railway rates affected the industry. Many gas undertakings were to-day paying more for railway rates alone than they paid previously for coal delivered on the gas-works. The price of gas had to rise to make both ends meet; and the public generally did not realize that, owing to the statutory position of gas supply undertakings, many gas companies had the maximum rate of dividend they could (not did) pay reduced as the price of gas rose, while municipally-owned undertakings, when given power to increase their gas charges, were expressly forbidden to hand over any profits to the relief of rates. Fortunately, during the last few months things had changed somewhat; and they trusted they had now turned the corner, and could continue to reduce their charges.

The lighting, heating, and power load in a factory formed a much larger proportion of the total cost of a manufactured article than was generally realized; and it was specially necessary in these times that such services should be supplied at the lowest possible rate. The gas industry was watching the industrial position very closely, and was desirous of rendering all possible service in order to assist manufacturers in their efforts to overcome the prevailing industrial depression. Many undertakings throughout the country had adopted special tariffs for gas used for motive and industrial purposes. This had been done in Birmingham; and he understood a special manufacturing rate was also charged in Coventry. Another direction in which gas undertakings were showing their desire to assist manufacturers was by the establishment of special departments to deal with problems peculiar to the use of gas for the many and varied industrial purposes. In Birmingham they had established special industrial research laboratories, in order to investigate the possibilities of gas for use in all kinds of industrial heating processes; and results had been distinctly encouraging. In 1919 over 2500 million c.ft. of gas—more than 21 p.ct. of the total make in that year—was used for industrial heating purposes alone. This figure was about half as much again as the total quantity of gas made in Coventry; while in England and Wales there were not a dozen undertakings outside London whose annual make exceeded the quantity used in Birmingham for industrial heating purposes only. With the revival of trade, they hoped to raise this figure to 30 to 40 p.ct. of the output.

A consideration of the question of the use of gas for industrial pur-

poses at once brought to mind the great possibilities which were to be found in the development of this very distinct branch of gas supply. Although tremendous strides forward were made during the course of the war, the gas industry might be said to be only standing on the threshold of the boom in gas consumption which must follow the application of coal gas to the solution of the varied problems and industrial processes in which heat was required. The use of gas for power purposes had long been an established fact, and in many cases had done much to ease the mind of the gas manager regarding the vital question of storage and equalization of the manufacturing load over the day. To maintain a constant output load was the idea of gas manufacturers; and increased demand for gas for industrial purposes, which meant a day load, was one which the industry must endeavour to obtain. The British Commercial Gas Association, during their ten or eleven years of life, had done much to bring home to the gas-consuming public the advantages and economies to be derived by the use of gas for lighting, heating, cooking, hot water, &c., and had lent valuable aid towards the solution of the housing problem. Now the Association had turned their attention to the industrial uses of gas, such conferences as this would serve a still more useful purpose.

THE DEVELOPMENT OF GAS FOR INDUSTRIAL PURPOSES.

The following paper prepared by Dr. C. M. WALTER, Engineer-in-Charge Industrial Research Laboratory Birmingham Gas Department, was (in the author's absence through indisposition) read by his assistant, Mr. R. H. Hems.

In the January issue of "THE GAS SALESMAN"—a new and useful supplement to one of our technical journals—one writer makes reference to the industrial field of use for town gas as a "great and dark continent which has to be explored to the full." I suggest that, although much good work has been done in the past, the gas industry as a whole needs to be continually on the alert, investigating all avenues which offer possibilities of reduction in costs of gas production in order to give manufacturers a fuel at as low a price as possible, and, in distributing, to make it their business to improve existing manufacturing gas-consuming apparatus, and thoroughly develop all applications of heat which may lead to increased gas consumption, generally making the most of the vast opportunity for development within our reach.

The future for industrial gas is alive with possibilities, and will see greater keenness on the part of all concerned than has been the case in the past in the multitudinous applications of manufacturing gas. With a view to stimulating discussion from all points of view, it is my intention briefly to survey the relative positions of those principally concerned in the developments which will take place—viz., the gas undertakings; the manufacturers of furnace apparatus; the manufacturing consumer.

THE GAS UNDERTAKINGS.

The position of the gas supplier with regard to industrial gas is one of interest. He is under obligation to supply a fuel which is now looked upon universally as ideal for the majority of manufacturing purposes, and which should be used by all who have civic and national interests at heart; and to obtain the load it is necessary to supply to the district served gas of a quality meeting most efficiently the majority of uses to which it is to be applied, at an economical cost. The supplier also has the advantage of balancing load during day time and summer time, when the domestic load is at its lowest.

The Gas Regulation Act places upon the gas undertakings the responsibility of supplying B.Th.U. to a fixed standard, to be paid for at the outlet of the consumer's meter, and also, in the event of alteration of the declared calorific value, to ensure that consumers' apparatus is adjusted to meet the new conditions. This responsibility, rightly undertaken, should tend to better feeling between the gas supplier and the consumer than has previously existed in certain instances, and should serve to allay the suspicions many consumers seem to harbour—that a gas undertaking is always supplying inferior quality gas. The attitude of the supplier towards the consumer should be one of keen business interest; no efforts being spared to obtain a new industrial consumer, to maintain and legitimately increase his consumption, and give sympathetic attention to any difficulties he may be experiencing with regard to his gas supply or apparatus.

The consumption of gas in Birmingham for industrial purposes has increased from 609,424,800 c.ft. in the year ended March, 1913, to 1,347,637,300 c.ft. in the year 1922. Other gas undertakings have obtained similar results by persistent attention; but many have as yet untapped a huge field which is theirs practically for the asking.

Much industrial consumption has been lost during the last year or two owing to the enormous disadvantages which have been obtaining in the matter of price. This has been due to conditions over which gas undertakings have had little control. To give a concrete instance, in certain types of brass-melting furnaces (which might be cited as having become "bread and butter" consumptions to many gas undertakings), consumption has fallen-off considerably—many manufacturers reverting to coke or adapting their furnaces for oil fuel, as costs have been in the region of 2 or 3 to 1 against town gas. Indications to-day point to the limit having been reached. Manufacturing costs, representing material and labour, are on the downward grade; and every reduction now taking place in the price of gas to the manufacturing consumers brings it forward again into competition with other forms of fuel for processes the costs of which, owing to the causes already mentioned, have increased out of proportion to other fuels, and also enables us to place before firms who have not adopted gas for similar processes the advantages from all points of view, including the cost question, to be gained by using town gas in their works.

THE FURNACE MANUFACTURER.

I have made particular mention of the furnace maker, because of the part he plays in the industrial gas scheme. It is only by active co-operation between the gas supplier and the maker of furnaces, burners, and similar apparatus that the gas consumer is going to obtain the service he has a right to expect from both. It is not sufficient to leave the whole business in the hands of the furnace apparatus makers. They have expended in the past much time and money in research into the industrial gas field from which the gas undertakings benefit to a very great extent. Their position, especially at the present time, is one of difficulty from a financial and sales point of view. They have a large number of standard patterns of furnaces evolved after years of change and alteration; and where they are asked for special furnaces, which need new designs and experimental work, this it seems to me should, in part, be undertaken by the gas supplier likely to gain the consumption involved in the installation, so that the initial cost of such an apparatus can be placed before the interested consumer at as low a figure as possible.

The industry has found the British makers of industrial apparatus well to the fore in the past years; and I am sure they are fully alive to the necessity of reducing manufacturing costs to the lowest extent in order to produce furnace apparatus for sale at reasonable prices in the future. From Birmingham experience I can safely say that the comparatively small number of furnaces, burners, &c., of foreign manufacture found in works is due to the excellence of the British product and the energy of the technical works and sales organizations of the manufacturers.

THE MANUFACTURING CONSUMER.

In dealing with the question of development from the manufacturers' point of view, it is difficult, in a discussion of this kind, to give sufficient information in detail which may be taken as being of use. Most manufacturers, I think, are agreed that the gas undertaking can supply them with a fuel which embodies ease of handling and measuring, cleanliness in handling, using, and disposal of waste products, elimination of smoke nuisance and expensive cartage costs for handling of rubbish—all points which go to make-up the ideal conditions in a modern works; and if, as mentioned before, the ideal fuel can be obtained at a reasonable price, manufacturers will create their own demand. Town gas has proved in the past such a boon in the production of goods in many works that manufacturers who have been compelled to discontinue its use owing to rising costs of running, have done so very reluctantly; and we have been assured in many instances in Birmingham that, immediately reductions in the price of gas take place, bringing the cost of running into competition with the costs of other fuels, manufacturers will gladly re adapt plant which has been completely changed over, although in many cases the gas-furnace apparatus has been left ready for re-use at very short notice. I have in mind two such installations; one an installation of aluminium melting furnaces, and the other a battery of nut and bolt forging furnaces, at present using oil as fuel. Although there are few cities with trades so widely divergent as those found in Birmingham, there are many which are common to all. Coventry, in particular, has much in common in the metal and cycle component trades.

MELTING.

The position of gas heating for the metal trades may be briefly summarized if we state that costs generally are to-day in the proportion of 2 to 1 in favour of coke or oil for the melting of common brass. This condition can only be altered by decreases in the price of gas, and further experimental work on known methods of heating with a view to economy. For the melting of higher melting-point and improved quality metals such as gunmetal, bronze, nickel silver, pure nickel, &c., the proportion is about 1½ to 1, although in the melting of the last-named, the quality of metal produced, the speed of melting, metal losses, and regulation of temperature, are such extremely important factors when considering good quality productions and the more exacting tests which are now applied generally to material during the processes of manufacture, that even though, fuel for fuel, gas costs so much more, manufacturers retain gas-furnaces for the purposes, as the advantages gained far outweigh the extra cost involved. Of course, as gas costs decrease, the position will become more favourable in both cases.

There are little changes in the general arrangement of furnaces from the cylindrical type, with burner or burners playing tangentially near the bottom of the crucible. Improvements are being made in burner construction to obtain more efficient combustion in the furnace itself, and also many notable improvements have been made in the gas and air mixing systems which are now to be obtained.

The melting of aluminium needs to be mentioned as a separate item. Town gas has proved itself such an ideal method of working this metal, which needs very careful and clean handling to maintain the many valuable properties which have brought it into such universal use, that, in the face of increased fuel cost, gas still holds the premier place as fuel for the melting of this metal. It might be interesting to note here that one firm alone in Birmingham took over 30,000,000 c.ft. of gas from us during the year ended Lady Day, 1922, for the production of aluminium castings. This firm, under ordinary trade conditions, have taken as much as 100,000,000 c.ft. per annum for similar purposes. We have other firms taking as much as 12,000,000 c.ft. per annum at the present time.

Furnaces in use for the melting of aluminium are principally of the iron pot type, with specially-constructed firebrick settings; the pots being heated by direct flame from a ring burner supplied with gas at high pressures varying from 5 to 12 lbs. per sq. in., gas at town pressure and air at 1½ to 2 lbs. per sq. in., or air-gas mixture systems. From the results which have so far been obtained with furnaces of the above-mentioned type, there is still great room for improvement; and the development of gas-heated melting furnaces offers scope, and will repay endeavours towards greater efficiencies.

OVEN FURNACES FOR HARDENING, ANNEALING, &C.

We can hardly say there appears much difference between the older types of melting furnaces and those in use at the present time; but if we turn to the field that is covered by the muffle and oven types of gas-heated furnaces, many changes have taken place in design of the furnaces themselves, and the application of gas burners and mixers to them. Things have certainly moved forward from the old-type bunsen burner furnace with little or no attempt at control of air supplies, through the many designs of pre-heated air-furnaces to the modern

regenerative and recuperative types of furnace; and improvements on these types are continually taking place. We have had submitted to us recently several designs of furnaces embodying new types of insulating bricks, which, in practice, are proving the claims made for them by the makers, as radiation losses from the outside walls of furnaces are reduced to a minimum. Too little attention has been paid in the past to these important factors in the design of furnaces. In existing furnaces it is possible to reduce these losses very considerably by outside lagging with suitable heat-resisting material.

The well-known processes for which these types of furnace are continually in use include, in the steel trades and the manufacture of car and cycle components, the annealing of strip steel and pressings during various stages of manufacture, the hardening and case-hardening of steel component parts during manufacture, and, in the non-ferrous trades, the heating of large brass billets for extruding and rolling and the annealing of strip brass and brass pressings during the process of working-up. Further, in furnaces coming under this heading, we have in Birmingham one firm consuming 3,000,000 c.ft. of gas per annum for the production of steel pen nibs.

Among the special applications of this type of furnace might be mentioned the annealing of malleable iron parts, and also the enamelling of iron and copper plates. There is a tremendous future for gas-heated furnaces in the enamelling trades. The modern gas-furnace is proving itself very satisfactory for sizes up to (say) 6 ft. by 4 ft.; and owing to its capabilities of control (almost a necessity for the production of special enamelled plates), and if developed along the correct lines, it will become a serious rival to the several types of solid fuel furnaces at present in use in the large enamel works.

SPECIAL USES.

The special uses for which furnaces of this type are used include porcelain firing and plate heating, and one might continue to name hundreds of special uses to which town gas is being applied because of the minimum amount of space occupied by the apparatus necessary, the cleanliness of work, ease and accuracy of control, and absence of fumes and smoke—all points which are in its favour when alterations of existing methods of heating or new schemes are under consideration in the modern works.

The following are a few consumptions of individual firms for various applications of industrial gas in our area of supply:

	Per Annum. C.Ft.
Cycle manufacture—	
Heat treatment, component parts, japanning, brazing, &c.	28,000,000
Tin-plate working—	
Soldering of kettles, saucepans, &c., tinning pots, &c.	3,000,000
Special high-temperature firing	2,000,000
Meter manufacture	2,000,000
Bedstead manufacture	2,000,000
Enamelling	600,000
Forging	3,000,000

It is "an ill wind that blows nobody good;" and I believe the high costs of gas which have prevailed, and are now prevailing, have caused most manufacturers to look very closely into the cost of working particular processes undertaken in their works with results to the good of themselves and the gas undertakings. It has been our policy in Birmingham to offer every facility for checking gas consumptions, and to suggest methods by which waste, leakage, and inefficient apparatus might be eliminated or altered to produce economies. If I may put forward the suggestion, it is a good thing for a works manager to call in a gas undertaking's representative periodically, and make a personal visit of inspection round his works to find out if all is well with the apparatus he is using. If the representative of a gas undertaking can gain the confidence of a manufacturer by giving correct advice in matters of this kind, he has gained one of the greatest assets he can possess for the work he has in hand.

A word in season here to manufacturers. To-day is the era of sectionalization and departmental control. If by the use of a separate meter to his particular section one can give a departmental manager or foreman the working costs of his section, he is undoubtedly in a better position to keep control of working costs, and will very quickly know of any inefficiencies of gas-consuming apparatus under his control. It is pleasing to note that the majority of manufacturers think "gas" when considering such propositions, and they should be kept very closely in touch with all the latest developments of industrial gas heating. This is where such an organization as the "B.C.G.A.," in co-operation with local gas undertakings, is carrying out its function, and will continue in the future to benefit the gas industry and the trade of the country generally. There is no fuel which meets all the obligations demanded by the modern works like town gas.

SMOKE ABATEMENT.

The gas industry is endeavouring by all possible means to provide cleaner and healthier atmospheres in our big cities by advising and installing gas-consuming apparatus in place of coal-fires. In our big cities, by far the greatest amount of trouble is caused by the huge volumes of black smoke which are emitted from the chimneys of the various works. The gas-heated furnaces can, and will in the future, eliminate this to a great extent. The manufacturer installing gas apparatus in new works is also spared the large initial capital outlay, owing to his not having to construct expensive chimneys.

In conclusion, and with a view to co-ordinating the three named divisions of this short paper, I wish to mention the developments in industrial gas which are taking place with the sanction of the Gas Committee in Birmingham. It is generally known that for some years we have had a department specializing in industrial gas matters, with office and laboratory accommodation at the Council House and demonstration foundry at our Windsor Street works. The need for centralization has been felt for a considerable period; and, after preliminary difficulties, demonstration rooms are being prepared in a building in the centre of the city, where industrial gas-furnaces and apparatus will be available for demonstration to any interested consumer, and the uses of gas will be continually demonstrated. Three rooms are at present nearing completion—a ground floor demonstration room, with window frontage to a main thoroughfare where the latest types of oven furnaces, high-speed and ordinary tool furnaces are to be shown, and a second-floor room where smaller types of apparatus are to be shown. In a third room, provision is being made for the demonstration and testing of the larger and high-temperature types of furnaces. In addition to these, stores and office accommodation is arranged.

The foregoing remarks will serve to indicate the lines on which Birmingham is working. It is intended that full descriptions of the demonstration rooms, and the apparatus contained therein, shall be published in a short time. It is hoped, by placing these extended facilities before Birmingham manufacturers, that the goodwill which has existed between the department and its industrial consumers will be maintained and increased, and that this section will be better able to keep in touch with the large number of manufacturers in the city and increase its knowledge of the requirements of the multiplicity of trades and processes carried on therein, so that gas may gain and retain the foremost position as a fuel meeting practically every requirement of industry.

Discussion.

Mr. LANGFORD said the paper had special interest to the Coventry Corporation and manufacturers; and he hoped it would be possible shortly to set-up furnaces. Of the gas locally used, 40 p.ct. was taken for industrial purposes, and this mainly by a few consumers. The Corporation realized the importance of that consumption; and a short time ago they reduced the price to 2s. 6d. per 1000 c.ft. where the quantity used was 2 million c.ft. per month.

Some speakers mentioned Mond and other gas, and asked how this competition was to be met.

Mr. HEMS said the Association must give their own answer. Manufacturers should consider the whole question in relation to current costs and efficiencies.

Mr. MASON invited individuals to communicate with the Association in matters of difficulty, and thus obtain expert advice.

GAS EQUIPMENT IN RELATION TO MODERN HOUSE SCHEMES.

Mr. W. H. BECKET (London) next read a paper on gas equipment.

Housing authorities all over the country are responsible for a very solemn trust—this is, to build and equip these new houses in conformity with modern requirements. No builder ever had such a splendid opportunity for providing excellent homes; and he hoped it would be possible shortly to set-up furnaces. Of the gas locally used, 40 p.ct. was taken for industrial purposes, and this mainly by a few consumers. The Corporation realized the importance of that consumption; and a short time ago they reduced the price to 2s. 6d. per 1000 c.ft. where the quantity used was 2 million c.ft. per month.

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Housing authorities all over the country are responsible for a very solemn trust—this is, to build and equip these new houses in conformity with modern requirements. No builder ever had such a splendid opportunity for providing excellent homes; and in the fulfilment of this laudable aim, the gas undertakings all over the country must necessarily play an important part. They are anxious to fulfil their public service; but many housing authorities have a wrong conception of what this entails, forgetting, or seemingly forgetting, that there are two things to which the gas undertakings must give consideration. These, placed in their correct order, are, first, the duty to their customers; and, secondly, their duty to the shareholders. A great number of the authorities have considered that their duty finished under the first heading, and have expected them to receive with enthusiasm offers of new business on terms which could only mean a large financial loss to the gas undertaking or an increased charge to the existing consumers, as this loss would be reflected in the price of gas.

ADVANTAGES OF "GAS SERVICE" IN HOUSING SCHEMES.

The natural lack of enthusiasm on the part of gas undertakings for a bad bargain is often asserted by their critics as a lack of enterprise; but this is not the case. Gas undertakings are always ready and eager to extend their business provided it offers some commercial inducement. The gas cooking-stove is approved for use in about 6500 houses and flats erected or in course of erection in the London area alone; demonstrating quite clearly that it is recognized that such apparatus is regarded as a necessity in any modern home, and that provision must therefore be made for gas in all these houses, even if it is only to supply this one domestic duty. But "gas service" has a much wider application, as will be seen by an examination of the apparatus and fittings being installed in these houses. This shows that in addition 29,384 lighting fittings, 4237 gas water-heaters, 1030 gas-coppers, and 4850 gas-fires are also being fitted, providing in most cases for the whole domestic services in which gas can be usefully employed; making it quite clear that while gas is essential, it is both superfluous and uneconomical to bring in electricity, as is done in some cases for lighting duty only.

WASTEFUL EXTRAVAGANCE OF DUAL SUPPLY.

The position of housing schemes has been complicated by the introduction of what is called a "dual system." This implies the introduction of electricity for lighting and gas as fuel. This dual installation increases the financial difficulties, as it entails not only the duplication of the interior installation, but also the duplication of the distribution scheme of mains and services to each house, with a corresponding increase in costs to the rate and taxpayer, and an inadequate revenue to both the gas and electricity undertakings. For example, a London borough council owning their own electricity undertaking obtained an estimate from the gas undertaking to equip their houses with an automatic meter, gas lighting, cooker, copper, and domestic hot-water supply for £9 per house. This price did not include the copper, which was purchased by the housing authorities. An alternative estimate was also obtained with the gas lighting deleted, for which work the gas undertaking required £12 per house; the increase being made necessary partially to counteract the loss of revenue. This authority decided to accept the latter estimate and instal electricity for lighting, with the result that they paid: For gas, £12; for nine electric lighting points, about £2 5s. per point, £20 5s.; making a total of £32 5s. per house, as against £9, which shows a waste of £23 5s. per house. In addition, they had to meet the additional expenditure of the electric cables, services, and meters for an average consumption of about 2½ units per house per week—a revenue which is totally inadequate for such a large capital expenditure. The Ministry of Health condemned the dual supply, and requested the housing authority to accept the gas

estimate of £9. This they refused to do; so they were informed that they would have to meet the expenditure of the electric lighting installation themselves.

GAS FUEL IS SMOKE ABATEMENT.

Dealing with the criticism against modern gas lighting—that it discoloured the ceilings, the lecturer went on to say that this discoloration takes place by reason not of dirt from the gas itself, but of the heat from the gas-burner setting-up a rapid current of air between the burner and the ceiling. The particles of black, which are unfortunately ever present in the atmosphere, are set in motion by the upward movement of the air, causing these small particles to impinge on the ceiling; and in time, with this repeated action, the discoloration becomes apparent. This can be modified by using small units of light and so distributing the heat. It is not the gas that has made the discoloration, which is the generally accepted theory, but the presence of dirt in the air, traceable almost entirely to the domestic chimney; and in the same proportion that a city suffers this smoke nuisance, so will the amount of discoloration be perceptible. This point is easily demonstrated, as in Manchester it is conceivable that in the smokiest parts the ceilings may require white-washing once a year. In the writer's home, in mid-Surrey, the smoke-nuisance is non-existent, and therefore where gas lighting is used the ceilings have not required attention for three years. If the modern fuel, gas, is adopted in a town, it can be used for lighting with far less of the attendant disadvantages of dirty ceilings.

Another extraordinary case of extravagance within the County of London came to my knowledge. The housing authority received an offer from the gas undertaking to equip their houses with gas lighting and cookers. The authority, who also own the electricity undertaking, wished to instal a dual supply of gas-cookers and electric lighting. The Ministry of Health refused the application, so the housing authority then put forward an "all-electric" scheme, costing about £50 per house. The Ministry of Health naturally refused to allow this expenditure, and instructed the authority to accept the gas company's scheme. This they refused to do, with the result that this large cost had primarily to be borne by the electricity department, indirectly by the other users of electricity in the borough, and directly by the ratepayers, as the Ministry refused to make any contribution whatever towards this exorbitant sum. A further burden is also falling on the same shoulders, as the cost of electricity for cooking and lighting was arranged at 2½d. per unit. Although this was found to be unprofitable, the price has since been reduced to 2d. per unit.

GAS SERVICE IS ECONOMY WITH INDEPENDENCE.

You will agree that the tenants of these houses surely cannot wish to be pauperized at the expense of their neighbours; and that is what this arrangement amounts to. Now I am sure that if the true facts had been put before them they would have preferred the gas scheme, with economy and independence. They are perfectly ready to pay a reasonable figure for lighting and fuel, but at the same time, if given the choice, they would naturally refuse to pay exorbitant prices for these domestic services, which are only necessitated by the introduction of electricity in a field where its use is totally unjustified. The position of housing is rapidly undergoing a decided change, and in a very short time the tenants will be in a position once more to select a house they desire. When this time comes, it will be a crucial test for the houses which are not suitably equipped. I am not endeavouring to be prophetic; but I am sure that a large number of these houses will then fail to pass the test of public approval. This is true in a number of houses erected at the public expense—erected, mark you, but not completed, as completion must and will come afterwards, when the public demand for adequate gas installations will have to be considered. The result will be that these new houses will need to be pulled to pieces and their decorations disfigured in order to instal the comprehensive gas service, which should have been anticipated and put in by the housing authorities when erection was proceeding. This not only applies to gas lighting and cooking, but also to gas heating, and, in a measure, to gas water-heating.

BUILDING ECONOMY.

Please do not think that I am suggesting that many of the authorities are not alive to the possibilities attached to the use of gas for economizing labour and building costs at a time when economy is absolutely essential. The "B.C.G.A." were first in advocating the introduction of "built-in" gas-fires with economy flues, with the result that a large saving is being made in building construction through the adoption of this system in various parts of the country. For example, in Manchester, Liverpool, Ormskirk, Shrewsbury, London, &c., it has been estimated that at least £10 per room has been saved by the installation of this system of gas heating.

The moment has arrived when the public should carefully consider how they are being served in this matter, and they should now ask for a definite statement from their local housing authorities as to whether this obvious means of obtaining economy and hygienic efficiency is being advantageously embodied. This inquiry should come before it is too late, if a large additional expense is not to be incurred in installing gas heating after the houses are built and decorated. Gas will eventually go in. If not at the proper time—during building operations—it will after the houses are tenanted. May I reiterate that gas undertakings are both willing and eager to carry out their public duty, not only in the letter but in the spirit, if they only receive reasonable financial co-operation from the housing authorities, and are offered at least a commercial proposition.

SAVE LABOUR IN THE HOME.

This is not a matter to which any of us can be insensible, be he a prospective tenant or only a poor taxpayer. It should undoubtedly be a matter for mutual agreement between the housing authorities and the gas undertakings—both doing their best to provide comprehensive gas installations, which are essential to make these new houses real homes for women to live and work in. By so doing it would enable them to enjoy the assistance of this applied science to their never-ending tasks, and benefit them to the extent of making some leisure possible for their own recreation, and also provide them with the opportunity of giving more time to the better upbringing of the future generation.

In these directions, gas is of inestimable value; and full advantage should be taken of "gas service" in all new houses. A turn of a tap will then provide: A breakfast cooked in less than 10 minutes, with a bright, warm room in which to serve it; the welcome warmth of an incandescent fire in the parlour for the chance visitor, or in the bedroom on cold nights, or for babies' baths, and for the hundred-and-one times that a fire is required for short periods; the brilliant, but diffused, light of the incandescent gas lamp, which is so strongly advocated by oculists, the use of which helps to take the chill off the air; a hot bath, or an ample supply of water at the requisite temperature for washing dishes; the advantages of the gas wash-copper and gas-iron—all these, and many other advantages too numerous to mention, by just "turning on a tap."

On the other side of the picture is solid fuel, as electricity is too expensive for these duties. Who has not experienced that feeling of hopelessness and sympathy for the housewife on entering a room in the early hours of the morning, and being confronted with the dead ashes of the very dear departed fire, with its accompanying film of dust over everything, and the realization that solid fuel stands for dirt, discomfort, and never-ending slavery for women, while gas means emancipation from most of this drudgery?

Discussion.

Mr. PATERSON said that at Cheltenham the Corporation could not come to terms with the Gas Company to put in mains on a new estate; and consequently the dwellings were without a gas supply. There was, therefore, the prospect of the houses being pulled about hereafter in order to instal at least gas-cookers.

Mr. SMITH observed that all the housing schemes of the country seemed to come into the gas question.

Councillor J. T. HARRIS (Coventry) favoured any steps which ensured the ridding of the atmosphere of pollution. Gas-fires, in place of the open hearth, were desirable; and he very much wanted the elimination of noxious smells from gas supplies.

Mr. F. C. BRIGGS (Dudley) advocated the equipment of houses in building for gas supply purposes.

Mr. BECKET replied to a well-sustained discussion, saying the medical staffs of London hospitals had satisfied themselves of the hygienic efficiency of the gas-fire.

Votes of thanks were accorded to the readers of papers, to the Corporation for their hospitality and for the use of the hall, and to Alderman Lloyd.

Tea was served in the hall before the meeting separated.

LIFE AND LIGHT.

Dr. C. W. SALEEBY in the evening lectured on "Life and Light." He laid down the fundamental requisites to healthy living, and among them named pure air and plenty of light. Nothing is left on the earth, he remarked, like some of the great English cities; and this brought him to Sheffield (with slides on a screen), and strong animadversions on the atmosphere there. The burden of the lecture was that the polluted air of towns sacrificed yearly 12,000 lives to tuberculosis. Sunlight he called the best antiseptic; and yet we cut off two-thirds of the supply by the smoke of towns. The abolition of this smoke was the main theme of his advocacy; and a suggestion that women should use their new political power in order to insist on better home conditions of atmosphere and work, elicited a rousing cheer from the audience.

The entire day's proceedings were highly successful.

Reduction in Price at Deal.—The Directors of the Deal and Walmer Gas and Electricity Company announce a further reduction of 1d. per therm in the price of gas, to take effect as from Jan. 1 last, making the current price 1s. per therm, which is equivalent to 4s. 6d. per 1000 c.ft.

Gas Boycott Collapses.—The boycott of gas by Wicklow consumers, which began in November last, has collapsed. It was undertaken as a protest against high prices. Gas is now being used in the town at the old figure—12s. 6d. per 1000 c.ft.—the Gas Company's offer of 11s. having been refused in January.

Improved Street Lighting for Otley.—Some clever people at Otley are attempting to ridicule the District Council, who have declared themselves as intending to stick to gas for public lighting, though electricity has been brought into the town from a private source. The Council have had under consideration a good many schemes for electric lighting in recent times, and have formed the opinion that it is too costly. The street gas lighting is to be improved by the installation in the lamps of triple-cluster burners.

Price of Gas at Mexborough.—A demand for some reduction in the price of gas at Mexborough has been made at a meeting of the Urban District Council. Mr. B. Caddick said that the Council should make their new representatives on the Mexborough and Swinton Gas Board understand that a reduction in price must be effected, either by means of a reduction in the staff or by other means, now that the gas was being supplied by the Manvers Main Colliery. He hoped their representatives would go with a mandate from the Council for a reduction. No dissent from this proposal was expressed.

Dublin Public Lighting.—On consideration of the Dublin Corporation estimates for the ensuing year, Alderman M'Donagh moved that the sum of £17,235 estimated for gas lighting be reduced by £5000; £2400 for materials, by £1000; £17,402 for arc lighting, by £2000; £3769 for current for incandescent electric lighting, by £1000; and £2000 for conversion of gas-lamps to electricity, by £1000. He did not think, he said, it was necessary the city should be fully lighted at night. Alderman Clarke, seconding, said that, even with these reductions, the total would be £4000 over last year's estimate. The motion for reduction was defeated by 14 votes to 10. On Councillor Loughlin moving to reduce the estimate for gas for public lamps by £5000, it was found there was not a quorum present; and the matter stood adjourned. In a letter received from the Dublin Citizens' Association, it was pointed out that "the item for gas for public lamps shows an increase of 75 p.ct. over that of last year;" and it was argued that, as the cost of gas production was less, it was evident too much gas was being purchased.

REPORTS ON OFFICIAL TESTINGS OF LONDON GAS.

For the Quarter Ended March 31.

The following reports for the past quarter of the official testings of the gas supplied by the South Metropolitan Gas Company and the Commercial Gas Company have been received from the Gas Referees —Prof. C. V. Boys, Mr. W. J. A. Butterfield, and Dr. J. S. Haldane. Both Companies fulfilled their statutory obligations.

South Metropolitan Gas Company.

[The Company were required to supply gas of an average calorific value for the quarter of not less than 550 B.Th.U. gross per c.ft., at which value 1000 c.ft. are equivalent to 5½ therms.]

The average calorific value for the quarter was 556·4 B.Th.U. gross.

On no day in the quarter was the calorific value at any testing-place deficient by 6 p.ct. or more.

No trace of sulphuretted hydrogen was found at any testing-place on any day during the quarter.

On no day in the quarter was the pressure at any testing-place less than 2 in.

Commercial Gas Company.

[The Company were required to supply gas of an average calorific value for the quarter of not less than 475 B.Th.U. gross per c.ft., at which value 1000 c.ft. are equivalent to 4·75 therms.]

The average calorific value for the quarter was 505·2 B.Th.U. gross.

On no day in the quarter was the calorific value at any testing-place deficient by 6 p.ct. or more.

No trace of sulphuretted hydrogen was found at any testing-place on any day during the quarter.

On no day in the quarter was the pressure at any testing-place less than 2 in.

THE CHEMICAL ENGINEERING GROUP.

Annual Meeting and Dinner.

The third annual meeting and dinner of the Chemical Engineering Group of the Society of Chemical Industry was held at the Hotel Cecil, London, on Friday last—Mr. J. Arthur Reavell, the Chairman of the Group, presiding on both occasions.

The minutes of the previous annual general meeting having been confirmed,

Mr. F. H. Rogers (the Hon. Treasurer) presented his financial report. This showed a credit balance of £58, instead of the deficiency of £164 in the accounts of the previous year. The membership now numbered 400, as against 425 for the preceding year and 510 in the first year.

The financial statement was adopted.

The Hon. Secretary (Mr. H. Talbot) then presented a report on the work of the General Committee during the year ended Dec. 31 last. This pointed out that the work had been somewhat restricted compared with previous years, on account of the necessity for conserving the resources of the Group. In conformity with the scheme of economy, no conferences were held during 1921; but a series of meetings were arranged in various provincial centres. The results of these meetings had convinced the Committee that an extension of this type of gathering was desirable, in addition to, and not instead of, the conferences which were held during the first two years of the Group's existence. It is intended that a conference should be held in Glasgow during the Society's annual meeting in that city; and it was hoped to arrange further meetings on the lines of those held last year. Negotiations had been carried on for many months by the Committee of the Group with a Sub-Committee of the Council of the Society, with the object of putting the relationship between the Group and the Council on a more enduring basis; and very successful results were achieved in this direction. In fact, it was emphasized that the relations between the Group and the parent Society were all that could be desired. These negotiations were carried on between Dr. Keane, Dr. Miall, and Mr. E. V. Evans as representing the Council of the Society, and Messrs. Reavell, Talbot, Rogers, and Hinchley on behalf of the Group. The Committee recorded with satisfaction the election of one of their number (Mr. C. S. Garland) to be Vice-President of the Society, and, under the new arrangements, the nomination of Captain Goodwin and Dr. Ormandy as the Group's representatives on the Publication of the Council.

The report was unanimously adopted, and a special vote of thanks passed to the Sub-Committee who carried out the negotiations with the Society.

An alteration to Rule 3 of the Group was agreed to by which the number of members of the Committee could be increased to not more than 20, instead of 10 as at present.

Following this alteration, it was announced that no nominations for members to take the place of the existing members having been received, these ten gentlemen would remain in office. The following were elected in addition: Prof. F. G. Donnan, E. A. Alliott, R. Howroyd, S. J. Tungay, J. M. Potter, W. J. Gee, Mr. Broughall, and Mr. Imison.

Mr. Reavell remains in office as Chairman, as do Messrs. Talbot and Rogers as Hon. Secretary and Hon. Treasurer respectively.

Annual Dinner.

At the dinner, which followed the annual meeting, after the loyal toast had duly been honoured,

Prof. J. W. Hinchley proposed "The Chemical Engineering Group," which, he said, was an interesting group of people who had banded themselves together to try to develop the subject of chemical engineering in this country, the study and efficient practice of which in Germany had meant so much to that country and the neglect of which had meant so much loss to this country. He coupled with the toast the name of Mr. Alliott, who was one of the Group's brilliant members. In this country our universities, our cabinet ministers, and our parliaments and councils did not believe in the existence of the chemical engineer. It was necessary therefore that some weapon should be in their hands to be able to tackle the powers that be, and ensure that chemical engineering was looked upon as a distinct profession, and that that profession should be encouraged and developed; for there was not much doubt that the future of this country depended as much upon its chemical engineering as upon anything else.

Mr. A. E. Alliott, replying to the toast, said that in the old days everybody was content to keep everything secret to themselves, whether it was a matter of special knowledge or common knowledge. They had now got to the stage where it was gradually becoming the thing to exchange knowledge in so far as it was not a matter of life and death to the people who possessed it. The Group was, in a sense, the first of several important bodies which had come into being in recent years. There was the Chemical Plant Manufacturers' Association, a body which was doing very useful work in its own special field closely allied to the Chemical Engineering Group. He did not know whether the work of the Group had been the inspiration for the formation of the Plant Manufacturers' Association, but certainly the work of the Group must be of considerable assistance to the latter Association. Again, the Group would serve as a very useful educational body for the new Institution of Chemical Engineers, which would fulfil a complementary function to that of the Group.

The Chairman, proposing "The Society of Chemical Industry," commented with satisfaction upon the relations now existing between the Group and the Society, and went on to discuss the position of the chemical engineer. Even the great Institute of Chemistry, which was represented by Mr. Pilcher, would admit that the brain power which they expended in bringing forward their wonderful laboratory schemes would be no use, if put into practice, without the engineer. Therefore, the Engineering Group was not formed before its time, although he was glad that they were now going to have something even better in the Institution of Chemical Engineers. A great many people had asked what was going to happen when that Institution was formed. He could at once say that when the Institution of Chemical Engineers was formed there would be no rivalry with the Chemical Engineering Group—there would be a brotherly working together, and each one would help the other. He went so far as to say that the chemist himself would be helped materially by the formation of the new Institution. So far as the Group was concerned, he wished to draw special attention to the conferences that were to be held in Glasgow. It was the wish of the Committee that everyone should make a point of going to Glasgow on that occasion, because there would be the Americans and the Canadians there; and it was desired to show them what could be done in the way of a conference in Scotland.

Mr. W. J. U. Woolcock, M.P., replying to the toast, and speaking as a member of the Council of the Society of Chemical Industry, said he was pleased that there was now no longer any question of the treatment of the Chemical Engineering Group by the Society, or the feeling of the Group towards the Society.

The toast of "The Visitors" was proposed by Mr. W. J. Gee and responded to by Mr. B. T. Sharples (who is over here on a visit from America). The toast of "The Chairman" was proposed by Mr. C. S. Garland; and the final toast was that of "The Honorary Secretary," proposed by the Chairman.

Development of Gas Supply in Lanarkshire.

The District Committee of the Middle Ward of Lanarkshire approved, on the 28th ult., of a minute of their Gas Supply Committee relating to certain questions affecting the development of the general scheme of gas supply in the Middle Ward district, and particularly the matter of the proposed immediate extension of certain high-pressure gas-mains. Mr. W. Doig Gibb (the Committee's Consulting Engineer), who was present, explained the developments in detail. He submitted a plan showing proposals for linking-up, as the next stage of the scheme, the gas undertakings within a restricted area, embracing, *inter alia*, Uddingston, Bellshill (already provided for), Larkhall, and Cambuslang. Within this area the supply of gas could be undertaken by the manufacturing stations of Uddingston and Cambuslang, without alterations or additions (except as aftermentioned) being required at either place in the meantime. By connecting Uddingston and Cambuslang, Mr. Doig Gibb explained that, in addition to the extra security that would be attained in the event of any serious accident taking place at either station, the fullest use could be made at all times of the cheapest make of gas. His recommendations accordingly were these: (1) That a high-pressure gas-main should be immediately laid between the Uddingston works and the Larkhall works, with a view to the supply of gas in the Larkhall district from Uddingston; (2) that at a later date a connecting main be laid from the Uddingston-Larkhall main along Whistleberry Road, *via* Blantyre to Cambuslang; (3) that the purifiers at the Bellshill Gas-Works be immediately transferred to the Uddingston works. A full discussion having taken place on the foregoing proposals, the meeting unanimously approved of same, and empowered the Clerk—who reported as to the present position of the negotiations with the Unemployed Grants Committee as regards their approval to the extensions of piping which had been put before them—to make all requisite arrangements, immediately he was in a position to do so, for having the extension from Uddingston to Larkhall carried out. Authority was also given for the removal of the Bellshill purifiers to the Uddingston works; the value of same to be determined later, and payment to be thereupon made to the Bellshill undertaking.

Bingley Gas and Electricity Supplies.—The Bingley District Council, as an early move after the recent elections, have decided to amalgamate the Electricity and Gas Committees. The town is one of the areas involved in the Bradford extension scheme, and, like many others, is fighting against absorption. The gas-works have proved successful; but the electricity undertaking, established in 1914, has lost over £9000, and has many times been out of order owing to dependence on an overhead service from Keighley.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 1.

In the London tar products market, there is a slightly better inquiry for pitch; and it is evident that there is still a certain amount of business to be placed for shipment this season. Makers' ideas as regards price remain unchanged at something between 75s. and 80s. per ton in bulk at works. There is also a fair inquiry for creosote, and, generally speaking, there are not large quantities available. The price is steady at about 6d. per gallon in bulk at sellers' works. Pyridine is in fair demand; but solvent naphtha remains quiet. The available quantities of sulphate of ammonia continue to be absorbed readily.

Tar Products in the Provinces.

May 1.

The average values for gas-works products during last week were: Gas-works coal tar, 34s. 3d. to 39s. 3d. Pitch, East Coast, 67s. 6d. to 70s. f.o.b. West Coast—Manchester, 62s. 6d. to 65s.; Liverpool, 62s. 6d. to 65s.; Clyde, 65s. to 67s. 6d. Benzole 90 p.ct. North, 2s. 1d. to 2s. 2d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct., naked, North, 2s. 1d. to 2s. 2d. Toluole, naked, North, 2s. 2d. to 2s. 5d. nominal. Coal tar crude naphtha in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 2s. 2d. to 2s. 4d. Heavy naphtha, North, 2s. 1d. to 2s. 3d. Creosote, in bulk, North, liquid, 4¼d. to 4½d.; salty, 3⅝d. to 4⅛d. Scotland, 3⅝d. to 4d. Heavy oils, in bulk, North, 6d. to 6¼d. Carbolic acid, 60 p.ct., 1s. 10d. to 2s. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. to 6d. per minimum 40 p.ct.; "B" unsaleable.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

This market remains fairly quiet, though in one or two directions there are signs that improvement is at hand. This is particularly the case with pitch and tar, owing to the contracts for road-making purposes which are now being placed. Elsewhere there is not much fresh to report, as production is generally small, with no likelihood of much improvement in the near future. Solvent naphtha is not plentiful, but there is sufficient to meet the demand, at prices ranging from 2s. 4d. to 2s. 6d. per gallon. Naphthalenes are dull, with crudes at £5 per ton, and refined £15 to £17. The carbolic acid situation is unchanged, with makers of crude being disinclined to sell at less than 1s. 9d.; while consumers—that is, manufacturers of crystals—are hardly able to pay 1s. 6d., especially as their production is only saleable at about 5½d. per lb. Cresylic acid is quiet at 2s. 2d. Creosote is not active; but the market is fairly steady at about 4⅜d. per gallon. In intermediate products business continues quiet, with a more steady show on export account. There is practically no change in prices in any direction.

Sulphate of Ammonia.

This market remains strong; the home agriculturists having at last absorbed practically all the make for the time being, so that the quantity available for export is considerably reduced. The scarcity of this fertilizer in America is also a feature of the situation, and it is quite probable that prices here will have to be advanced after the end of this month.

Novel and Successful Capital Issue at Harrogate.

A successful issue of capital on rather novel terms was recently made by the Harrogate Gas Company. It was desired to raise £40,000 by the issue of redeemable 6 p.ct. preference stock at a discount; the price being £95 per cent., redeemable in fifteen years, or at the option of the Company at any time after the expiration of the fifth year. In the event of the Company exercising this option, the proprietor is to have the right to require his capital to be redeemed by the issue of £70 of consolidated ordinary stock, bearing a maximum dividend of 10 p.ct., for every £100 of redeemable preference stock. The application list was opened at 9 o'clock on the morning of April 12; and by 10 o'clock the amount was fully subscribed. In order, however, that proprietors and investors living at a distance should have an opportunity of making application, the Directors decided to keep the list open until 10 o'clock on the 13th, and gave notice in the evening papers to that effect. By this time the capital was over-subscribed more than three times. As the capital is being raised under the Public Utility Companies (Capital Issues) Act, the allotments were made *pro rata* to the amount applied for.

Coke-Oven Gas for Chesterfield.—Alderman G. Clark (the Chairman of the Chesterfield Corporation Gas Committee), together with Mr. H. Davies (the Gas Engineer), has had an interview with representatives of the Grassmoor Company, Ltd., in regard to a supply of coke oven gas in the district. A Sub-Committee have also been appointed to deal further with such coke-oven gas supply, and with the question of a suggested new installation of plant at the central gas-works.

Fatality at the Meadow Lane Works.—At the Meadow Lane Gas-Works of the Leeds Corporation, on the 27th ult., Harold Oldfield, a labourer, belonging to Beverley, who was engaged on work in connection with the installation of new vertical retorts by Messrs. Robert Dempster and Sons, Ltd., of Elland, was caught by a crane and crushed against a wall. The wire rope of the crane had to be cut before he could be released, by which time the ambulance was in waiting. He, however, died on the way to the Infirmary. He had been employed only a week on the work.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for April 26.]

Nos. 10,720 to 11,406.

AKTIEBOLAGET LJUNGSTRÖMS ANGTURBIN.—"Regenerative air and gas preheaters." Nos. 10,879-80.

ARMITAGE, J. A.—"Pressure-fed apparatus for gas firing steam-boilers." No. 11,222.

BARTLETT, E. E.—"Heating or annealing furnaces." Nos. 10,816-17.

BRITISH BRASS FITTINGS, LTD.—"Gas fittings, brackets, pendants, &c." No. 11,102.

BUSCHENHENKE, G. H.—"Automatic safety-valves for gas-pipes." No. 10,922.

CANDY, F. P.—"Apparatus for automatically controlling rate of flow of liquids." No. 11,219.

CARGIN, J. F.—"Means of economizing gas in gas stoves, cookers, &c." No. 11,353.

CHRISTOPHER, J. E.—"Apparatus for neutralizing and drying sulphate of ammonia." No. 11,236.

CUTLER, E. E. & S.—"Guide-carriages for spiral gasholders." No. 10,984.

DAVIES, W. E.—"Carbonization and/or gasification of fuels." No. 11,150.

DULEY, W. E.—"Non-return valves for gas-fittings, &c." No. 11,342.

ENSTONE & Co. (Successors), LTD., T. C.—See Duley. No. 11,342.

EVANS, O. B.—"Manufacture of gas." No. 11,313.

FOSTER, T. J.—See British Brass Fittings, Ltd. No. 11,102.

GREENWOOD, F.—See Armitage, J. A. No. 11,222.

HADLEY, W. WRIGHT-.—"Atmospheric gas-burners." No. 11,256.

HEMMERICH, L.—"Cocks, valves, &c." No. 11,072.

HUMPHREYS & GLASGOW, LTD.—See Evans, O. B. No. 11,313.

HUNT, A. H.—"Incandescent mantles, &c." No. 10,865.

HUNTER, C.—See Hadley, W. Wright-. No. 11,256.

INGRAM, N. G. S.—See Cargin, J. F. No. 11,353.

KAY, S. R.—See Christopher, J. E. No. 11,236.

KENNEY, R.—"Geysers." No. 10,954.

LANDIS & GYR AKT.-GES.—"Prepayment meter." No. 11,305.

LITTLEJOHN, D.—See Kenney, R. No. 10,954.

MARONE, A.—"Automatic gas-burner lighting and extinguishing devices." No. 10,885.

MITCHELL, W. A.—"Pipe, &c., connections." No. 11,176.

MUSGROVE, C.—See Bartlett, E. E. Nos. 10,816-17.

NEWLAY WHEEL COMPANY, LTD.—See Bartlett, E. E. Nos. 10,816-17.

REID, T. A.—"Manufacture of gas fuel from lime-kiln gases." No. 10,911.

ROSS, R. C.—See Mitchell, W. A. No. 11,176.

TAYLOR, J. T.—See Kenney, R. No. 10,954.

TERZIAN, H. G.—See Evans, O. B. No. 11,313.

THWAITE, A. H.—"Apparatus for simultaneously drying, grinding, and neutralizing acid sulphate of ammonia salts." No. 11,196.

TRADE NOTES.

Fuel Economy.

As showing that manufacturing undertakings are alive to the need for saving, Messrs. Meldrums, Ltd., of Timperley, near Manchester, point out that their fitments of fuel economy apparatus during slightly over the month of March numbered well over a score. They included forced-draught furnaces for five gas departments, the Fuel Research Board, and an engineering concern.

Bexhill Gas Charges.—The Bexhill Ratepayers' Association have unanimously passed a resolution asking the Town Council to take action with reference to the proposal of the Bexhill Water and Gas Company to apply for powers to increase their charges, as they think the present prices are excessive. There was an addendum to the effect that if the Council could not take the matter up, the Association's Clerk should oppose the application.

Middlesbrough Profits and the Rates.—Besides having decided to contribute £10,000 from profits to the relief of the heavy burden of rates, the Middlesbrough Corporation Gas Committee are expected to bring forward at the next meeting of the Town Council a recommendation that the price of gas should be reduced by 1s. per 1000 c.ft. This will bring the net cost down to 3s. At a meeting of the Town Council last Wednesday, Mr. J. Wesley Brown (the Chairman of the Finance Committee) said he knew the Chairman of the Gas Committee had consented somewhat reluctantly to the £10,000 allocation; but it could be well afforded, and such relief would be much appreciated by the ratepayers.

Deficiency at Dewsbury.—The Dewsbury Town Council, sitting in Committee on Friday last, were somewhat staggered to learn of a reported loss of £31,194 on the working of the Gas Department for the year ended March 31; bringing the total deficiency, with a loss of £21,057 brought forward from the previous year, to £52,251. It is understood that at the open Council meeting to take place to-morrow (Thursday) a notice of motion demanding an inquiry by an expert will be considered. Alderman J. M'Cann (the Chairman of the Gas Committee), in an interview last week, attributed the big loss to the high cost of coal during the miners' stoppage. They had expected a deficiency, but not one so heavy, because they had not been able to anticipate the slump in value of residuals. Costs had since materially declined; and the Committee hoped the present gas prices would right the situation in due course. The charges had been lower than with many undertakings. In March, 1914, there was a credit balance on the department of £18,042, out of which £10,000 was taken for relief of rates. The position has been adverse for several years now; but never on such a big scale as during the past year.

All-Gas Homes.—In Toronto earlier this year an electric home, specially fitted-up to show electricity in its application to domestic service was open for public inspection. The "Intercolonial Gas Journal of Canada" learns that some 10,000 or more people took advantage of the occasion to look in and inspect the many electrical appliances now obtainable for use in the home; and also that there were lately shown other such homes in over 200 cities and towns in the United States and Canada. The question is asked why, if electrical men find such propaganda work pays in the development of their industry, the same idea cannot be spread broadcast in aid of gas. Though there have been all-gas homes displayed in the past, it is urged that these have been more or less in a "hit-and-miss sort of fashion;" and as the cost is comparatively small, considering the results to be obtained, and there are about as many gas appliances for domestic service as electrical, our contemporary rightly feels that good would follow if the establishment of a few all-gas homes was gone on with.

Unfenced Machinery.—At the Leyburn Police Court last Friday, the Gas Company were summoned under the Workshops and Factories Act, 1901, on a charge of failing to have the projecting end of a crankshaft sufficiently fenced to safeguard employees from accidents. The Magistrates' Clerk pointed out that the inspector under the Act could not charge the Company; so by agreement the summons was altered making Leslie Dobson, on behalf of the Company, the defendant. When an inspector saw the shaft in March, he pointed out to the Manager (Mr. Edwin Johnson) that he had complained about the same shaft last October. The defendant (Mr. Dobson) said he was not connected with the Company last October, and therefore knew nothing about the first complaint. Mr. Johnson said the engine was not fenced, but he could pull it up by holding a piece of cloth round the shaft. The defendant added that as soon as he heard of the complaint, he had a guard made. In view of all the circumstances, the Bench took a lenient view, and ordered payment of costs.

STOCK MARKET REPORT.

A CHANGE came over the spirit of the Stock Exchange last week. The gilt-edged market was flat. Home Government issues were freely offered; Friday's prices for the big four being: Consols 58⅛-59⅜, War Loan 99-99½, Funding 87-87⅜, Victory 88⅜-89¼. Rails, the Foreign Market, and many others also suffered.

In the Gas Market the trend of prices was still upwards, and many issues participated in it. In the London Companies, Gas Light preference rose 2, and ditto debenture 1, South Metropolitan debenture 2, Commercial 4 p.ct. and 3½ p.ct. 1 each. In the Suburban and Provincial group, Aldershot rose 5, Brentford debenture 8, Brighton original 3, and ditto "A" 2½, British 1, Maidstone 28½, South Suburban 2, ditto debenture 9, Wandsworth "A" 4½, ditto "B," "C," Wimbledon and Epsom 4 each, and ditto debenture 2½. In Continentals, Union rose 9, ditto preference 2, European ¾. In the remoter world, Bombay rose ¼, Cape Town debentures 5, Orientals 6.

Bargains done for cash during the week were as follows: On Monday, Alliance and Dublin 65½, Bombay 4⅜, British 30½, Cape Town debenture 62, Commercial 3½ p.ct. 90, ditto debenture 60, European 12, Gas Light ordinary 89½, 89¾, 89⅞, 90½, ditto preference 81, 82, ditto debenture 60, Imperial Continental 168, 168½, 170, South Metropolitan 95, 95½, 96, 96⅛, 97, 97½, Swansea 6⅓ p.ct. debenture 105, 105½, 105⅝, 105¾. On Tuesday, Continental Union 35, Gas Light ordinary 89½, 89⅝, 89¾, ditto preference 81, ditto debenture 61, Imperial Continental 167, 168, 168½, Primitiva preference 52s., Sheffield "A" 91, South Metropolitan 95, 95½, 96, 96½, South Suburban 99, Liverpool 7 p.ct. preference 106½, Swansea 7 p.ct. preference 102⅜, 102⅞, ditto 6½ p.ct. debenture 105½, 106. On Wednesday, Aldershot preference 67½, Alliance and Dublin debenture 57½, 60, 65⅜, 65⅞, Brentford debenture 75, 79⅜, Brighton and Hove original 159, 160, 161, Commercial 4 p.ct. 90, ditto 3½ p.ct. 92, Continental Union 37, Gas Light ordinary 89½, 89⅝, 90, 90¼, 90⅜, ditto maximum 64½, 64⅝, ditto preference 81½, 82⅛, ditto debenture 61, 62, Imperial Continental 167⅜, 168½, 169, Lea Bridge 87, Monte Video 63, Primitiva 13s. 9d., 16s., ditto preference 53s., 53s. 3d., 54s. 6d., South Metropolitan 95, 95½, 96, ditto debenture 60, South Suburban 96, ditto debenture 87, 87½, 90, Grays and Tilbury "B" 6⅞, 7, Hornsey 5 p.ct. preference 80, ditto 4 p.ct. debenture 70, 72½, Southend 4 p.ct. debenture 67½, Swansea 7 p.ct. preference 103, ditto 6½ p.ct. debenture 106. On Thursday, Aldershot preference 70, 70½, 73, 73½, Alliance and Dublin 65, 65½, ditto debenture 60, Bombay 4⅜, Bournemouth "B" 9⅞, 10, Brentford debenture 79⅜, Cape Town preference 5½, Continental Union 37, European 11⅞, 12½, 12⅝, Gas Light ordinary 89½, 89¾, 90, 90⅛, 90¼, ditto maximum 64, 64½, ditto preference 81, 81½, Imperial Continental 166, 167, 167½, 167⅛, 168, 168½, ditto debenture 75, Primitiva preference 51s. 6d., 52s. 6d., 54s. 9d., ditto debenture 72, South Metropolitan 95, 95½, 96⅛, ditto debenture 62, Hornsey 4 p.ct. debenture 72½, Mid-Kent 14s. 6d., Swansea 7 p.ct. preference 102⅜. On Friday, Alliance and Dublin 65, 65½, Cape Town debenture 70, European 12, 12⅛, 12¼, Gas Light ordinary 89½, 89⅝, 89⅝ 89¾, 90⅛, 90⅜, 90½, ditto debenture 63, Imperial Continental 167½, 168, 168½, 168⅝, 169, 170, Primitiva 16s., 17s., South Metropolitan 95½, 95½, 96, South Suburban 100, Hornsey 5 p.ct. preference 84½, Southend 4 p.ct. debenture 70, Swansea 7 p.ct. preference 102½, 103, ditto 6½ p.ct. debenture 106½, Toronto Consumers 155.

The Bank rate is 4 p.ct., as fixed on April 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mch. 15	4	4%	Aldershot 4 p.c. Pref.	..	65—70	67½—73½
1,551,868	,,	Apl. 12	2½	3⅝%	Alliance & Dublin Ord.	59—64	62—67	65—65½
374,000	,,	Jan. 12	4	4%	Do. 4 p.c. Deb.	76—79	55—60	55½—60
280,000	5	Nov. 30	7½	4/-	Bombay, Ltd.	5⅞—6⅜	4¼—4⅜	4⅜
100,000	5	Feb. 23	16	7½%	Bournemouth Gas & Water { 5 p.c.	..	9¼—10½	...
383,110	10	,,	7	7%	B 7 p.c.	15—15½	9—10	9⅞—10
115,000	10	,,	6	6%	Pref. 6 p.c.	13½—14	8—9	...
162,065	—	Dec. 30	—	4%	4 p.c. Deb.	..	65—70	...
992,045	Stk.	Feb. 9	14	56/-	Brentford A Consolid.	261—266	88—93	...
734,920	,,	,,	11	55/-	Do. B New	204—209	88—93	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	80—85	...
221,400	,,	Dec. 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	75—79⅞
214,775	,,	Mch. 15	11	11½%	Brighton & Hove Orig.	208—213	157—162	159—161
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	115—120	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	...
530,000	20	Mch. 15	12½	10%	British	44—45	29—31	30½
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—72	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	55—60	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	6—7	...
100,000	10	Apl. 27	—	4½%	Do. 4½ p.c. Pref.	4—6	5—6*	5½
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	65—70	62—70
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	Mch. 15	5/9/4	42/8	Commercial 4 p.c. Stk.	106—108	88—93	90
560,000	,,	,,	5½	38/4	Do. 3½ p.c. do.	103—105	88—93	90—92
475,000	,,	—	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	57—62	60
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	37—42	35—37
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	50—55	...
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	185—195	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	..	145—155	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	Jan. 26	10	5/0	European, Ltd.	17½—18	11⅝—12¼	11⅞—12⅜
16,298,975	Stk.	Feb. 23	4/17/4	46/8	Gas Light & Coke { 4 p.c. Ord.	98—102	89—91	89½—90½
2,600,000	,,	,,	3½	35/-	3½ p.c. max.	76—79	63—66	64—64½
4,062,235	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	78—83	81—82½
4,674,850	,,	Dec. 15	3	3%	3 p.c. Con. Deb.	72½—74½	58—63	60—63
130,000	,,	Dec. 11	10	10%	10 p.c. Bonds	..	..	...
82,500	,,	Sept. 14	5	3½%	Hastings & St. L. 5 p.c.	..	..	...
258,740	,,	Mch. 15	3½	2½%	Do. 3½ p.c.	87—89	45—55	...
70,000	10	May 12	11	5%	Hongkong & China, Ltd.	16½—16¾	5½—6½	...
86,600	Stk.	Mch. 15	9	9½%	Hornsey 7 p.c.	..	100—105	...
131,000	,,	,,	7½	7½%	Ilford A and C	151—154	110—120	...
65,780	,,	,,	6¾	5¾%	Do. B.	115—118	96—101	...
65,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	65—70	...
1,976,000	,,	Oct. 28	9	5%	Imperial Continental	150—160	167—172	166—170
404,800	,,	Feb. 9	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	72—77	75
235,242	,,	Mch. 15	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	83—88	87
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A.	211—213	..	...
						{ B. 146—148	..	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,,	Feb. 23	7/5/6	6%	Maidstone 5 p.c.	..	80—85	...
63,480	,,	Dec. 30	—	3%	Do. 3 p.c. Deb.	..	48—51	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4⅜	2⅜—3⅜	...
250,000	100	Apl. 3	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	91—98	...
541,920	Stk.	Nov. 30	4	4%	Monte Video, Ltd.	11½—12	61—66	63
1,875,892	,,	Feb. 23	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	74—76	...
529,705	,,	Dec. 30	3½	3½%	Do. 3½ p.c. Deb.	82—83	66—67	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	12⅜—13	...
55,940	10	Mch. 15	7/14/0	10/13	,, ,, 7 p.c.	14—15	10—11	...
300,000	Stk.	Dec. 15	8	8%	Oriental, Ltd.	117—122	90—95	...
60,000	5	—	10	—	Ottoman, Ltd.	7½—7⅞	2—3	...
188,120	Stk.	Dec. 30	—	6%	Plym'th & Stonh'se 5 p.c.	..	69—71	100†
60,000	50	Mch. 15	13	62/6	Portsea Island, B	128—131	87—90	...
100,000	50	,,	12	57/6	Do. C	118—121	78—83	...
249,980	5	—	8	—	Primitiva Ord.	5½—6	⅜—⅝	13/9—17/-
499,960	5	—	5	—	Do. 5 p.c. Pref.	4⅝—5	2 1/16—2 3/16	51/6—54/9
521,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	70—75	72
600,000	Stk.	Jan. 26	4	4%	Do. ,, ,, 1911	..	55—60	...
346,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	55—60	...
150,000	10	Mch. 30	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	5¼—6¼	...
125,000	50	Jan. 3	5	5%	5 p.c. Deb.	47—49	36—39	...
135,000	Stk.	Mch. 15	10	5%	Sheffield A	223—224	89—92	91
209,984	,,	,,	10	5%	Do. B	222—224	89—92	...
523,500	,,	,,	10	5%	Do. C	220—222	89—92	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	Oct. 28	9	8%	South African	10½—11½	7—9	...
6,609,895	Stk.	Feb. 9	5/4/0	5%	South Met Ord.	111—113	95—98	95—97½
250,000	,,	Jan. 12	—	5%	Do. Red. Pref.	..	96—98	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	60—63	60—62
224,820	,,	Feb. 23	8½	8½%	South Shields Con. Stk.	157—159	106—108	...
1,087,795	,,	,,	6	5½%	S'th Suburb'n Ord. 5 p.c.	114—116	95—100	96—100
368,837	,,	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	87—92	87—90
647,740	,,	Nov. 16	5	4%	Southampton Ord.	99—102	61—64	...
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	60—62	...
120,000	,,	Feb. 23	—	7½%	Tottenham { A 5 p.c.	135—138	95—100	...
782,275	,,	,,	6	5½%	District { B 3½ p.c.	115—117	85—90	...
181,255	,,	Dec. 15	4	4%	4 p.c. Deb.	87—89	68—72	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Mch. 15	5	3½%	Tynemouth 5 p.c. max.	108½—109	68—70	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Mch. 15	8½	66/3	Wandsworth A 5 p.c.	151—156	85—90	...
255,636	,,	,,	6½	51/3	Do. B 3½ p.c.	129—134	72—77	...
108,075	,,	,,	—	46/4½	Do. C.	..	71—76	...
140,865	,,	,,	—	46/4½	New Ordinary	..	63—66	...
352,000	,,	,,	6½	45/-	Wimbledon 5 p.c.	117—122	70—75	...
98,000	,,	,,	6½	50/-	Epsom 5 p.c.	121—126	70—75	...
88,416	,,	Dec. 30	3	3%	5 p.c Deb. Stk.	66—69	53—55	...

* Ex Div. † Reported transaction.

Price Reduction at Mossley.—The price of gas in the area of the Mossley Corporation Gas Department has been reduced from 4s. 10d. to 4s. per 1000 c.ft. The quality of the gas supplied is 500 B.Th.U.

Reduction in Price at Wallasey.—The price of Wallasey gas is to be reduced by the Corporation in June from 3s. 4d. to 3s. per 1000 c.ft., with an additional penny per shilling rebate in the case of slot-meters. This concession has been made possible by a reduction of wages, representing £2700 per annum, and by the fact that coal is cheaper.

Oriental Gas Company's Dividend.—The Secretary of the Oriental Gas Company, Ltd., has called attention to a printer's error in connection with the paragraph dealing with the interim dividend which appeared on p. 213 of last week's issue of the "JOURNAL." The dividend will be at the usual rate of 3½ p.ct, (not 3 p.ct. as previously stated) less income-tax.

Unemployment and Unpaid Gas Bills.—At a recent sitting in the Sheffield Court House, there was a queue of nearly a thousand persons, who had not paid their gas bills, and had been summoned by the Gas Company. The majority of the defaulters were unemployed, who had had their gas "cut off" for some weeks. The collectors of the Gas Company were present at the Court House; and arrangements were come to with most of the people for small weekly payments to be made until the arrears were wiped out. They were not the ordinary bad payers, but appeared to be genuine victims of the trade depression.

A new issue of capital in the Felixstowe Gas Light Company is being made, on behalf of the Directors, by Messrs. A. & W. Richards, of No. 37, Walbrook, E.C. There is offered for sale by tender £15,000 of 7 p.ct. preference stock, to be redeemed at par on July 1, 1932; the minimum price of issue being par. The capital is required to pay for extensions of works and plant rendered necessary by the constantly increasing demand for gas.

A plumber employed by the Montrose Gas Company, Ltd., has met his death through asphyxiation. He was overcome by the escape of gas from a pipe he was repairing.

The first annual meeting of the Cardiff Gas Company's Athletic and Social Club, which has been in existence about nine months, was held in the Grand Hotel, Cardiff, last Thursday evening—Mr. George Clarry, F.C.I.S. (the President), in the chair. Very gratifying reports were presented, indicating that the Club had 750 supporters, of whom 327 had qualified for full membership; and there was a credit balance of £46. The Directors of the Company had generously provided a pavilion and effected numerous improvements to the recreation ground adjoining the Grangetown works. The official opening of the pavilion had been performed by the President on Saturday, Nov. 26. Smoking concerts, dances, and whist drives had been arranged during the winter; while early in the new year the members' children were given a tea and entertainment, and received toys and other gifts. Satisfactory statements were submitted respecting the Rugby and Association Football, Baseball, Cricket, and Tennis Clubs, and the Entertainments and Holiday Fund Departments. The President announced that the question of recreation ground extension and provision of an institute was merely a matter of time. The principal officers were re-elected as follows: President, Mr. G. Clarry; Vice-President, Mr. H. D. Madden; Chairman, Mr. R. G. Shute; Treasurer, Mr. R. J. Auckland; General Secretaries, Messrs. H. S. Bartlett and T. Noall; Assistant Secretary, Mr. A. E. Hall. At the conclusion of the business a musical programme was provided. During the evening Mr. A. G. Barry, who has been Outdoor Superintendent to the Company for a number of years, but has recently resigned, was the recipient of a handsome leather travelling trunk; the presentation being made by Mr. Clarry (General Manager and Secretary), after speeches by Messrs. R. J. Auckland (Assistant Secretary), T. Noall (Internal Auditor), R. G. Shute, J. B. James, and others. Mr. Barry suitably responded.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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Particulars may be obtained on Application to the Committee's Architect, Mr. John H. Jacques, Lic. R.I.B.A., of 2, Fen Court, Fenchurch Street, E.C. 3.
Tenders, on the Forms and in the envelope supplied, must be delivered by Registered Post at the Education Department, 95, The Grove, Stratford, E. 15, not later than 6 p.m. on Monday, the 15th of May, 1922.
The Committee will not be bound to accept the lowest or any Tender.
The Contractor whose Tender is accepted, and with whom a Contract is entered into, will be required to pay to the whole of his workmen such rate of wages and observe such hours of labour as are recognized by the Trades Unions. In the event of any breach of such agreement, the Council will enforce the penalty clause in its entirety.

By order,
GEORGE E. HILLEARY,
Town Clerk.

Education Department,
95, The Grove,
Stratford, E. 15,
April 28, 1922.

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TO WATER AND GAS ENGINEERS, CONTRACTORS, &c.

THE Water Committee of the Ripon City Council are prepared to receive OFFERS for the Purchase and Removal of 129 CAST-IRON PIPES (Complete with Spigot and Socket) 12-feet long, 12 inches diameter, now lying on the roadside at Kirkby Road, Ripon.
Each pipe weighs approximately 8¼ cwt., is perfectly sound, and coated inside with Bowranite.
Further Particulars and Permission to View may be obtained from the Water Manager, Town Hall, Ripon.
Tenders, in sealed envelopes and endorsed "Water-Pipes," must be addressed to, and delivered at the office of, the undersigned not later than first post on Monday, May 22, 1922.
The Council do not bind themselves to accept the highest or any Tender.

J. HENRY GOUGH,
Town Clerk.

Town Hall, Ripon,
April 27, 1922.

GUILDFORD GAS LIGHT AND COKE COMPANY.

TENDERS are invited for the Purchase of about 50,000 Gallons of CRUDE TAR, f.o.r. Guildford, filled into Buyer's Barrels or Tank Wagons.
Tenders to be sent to the undersigned on or before Thursday, the 11th inst.
Further Particulars can be obtained from Mr. P. C. Cleasby, Manager, Gas-Works, Guildford.

WILLIAM TIPLEY,
Secretary.

Gas Offices, Guildford,
May 1, 1922.

CORPORATION OF CALCUTTA.

NOTICE TO CONTRACTORS.

SUPPLY AND DELIVERY OF LIGHTING STORES.

TENDERS are invited, in duplicate, for the Supply and Delivery of LIGHTING STORES for Public Street Lamps and Municipal Institutions alternatively for Six Months' and a whole Year's requirements. The articles required are (*a*) INVERTED INCANDESCENT GAS-MANTLES for Street Lighting; (*b*) GLASS BULBS for Inverted Burners; (*c*) GLASS PANES for Street Lamps; (*d*) DOUBLE TIN SHEETS.
Samples of these articles are required and should be addressed to the Superintendent of Stores to the Corporation, 149, Lower Circular Road, Calcutta, carriage paid.
Tenders must include delivery free of all charges at the Corporation Stores, Calcutta, including Duty and Insurance against Breakage and Marine Risks.
The Corporation do not bind themselves to accept the lowest or any Tender, and will be at liberty to accept the whole or part of a Tender. Tenderers may quote for any or all of the items mentioned in the list. Payment will be made when delivery is accepted.
Tenders should be submitted, in duplicate, and should be enclosed in sealed covers superscribed "Tender for Lighting Stores." They should be addressed to the Deputy Chairman, Corporation of Calcutta, Central Municipal Office, 5, Corporation Street, Calcutta, and should reach him on or before Monday, the 26th of June, 1922, up to 2 p.m., when they will be opened in the presence of such Tenderers as may be present. Tenders must remain open for acceptance for at least six weeks from the date of their opening.
Specification with Tender Form, in duplicate, and also copies of Tender rules, may be obtained in England from the Offices of the "GAS JOURNAL" or the "Gas World."
No Tender will be considered unless accompanied by a remittance to the extent of 2½ p.ct. on the total value of such Tender. Tenderers must abide by the rules in regard to Tenders in vogue in the Corporation, and are required to submit Tenders in duplicate on the Corporation form above referred to.

B. V. RAMIAH,
Secretary to the Corporation.

Central Municipal Office,
Calcutta,
The 12th of April, 1922.